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Air Force Systems Command

AD-A206 894

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TECHNICAL REPORT SUMMARIES



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INTRODUCTION

The Air Force Office of Scientific Research Technical Report Summaries are published quarterly as of March, June, September, and December of each calendar year. They consist of a brief summary of each AFOSR technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. The summaries contain two indexes for easily locating the technical reports that may be of interest to the user. These are followed by abstracts of the reports.

1) SUBJECT INDEX

- a. Subject Field
- b. Title of Report
- c. AD Number (Accession Number)

2) PERSONAL AUTHOR INDEX

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PURPOSE

The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

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AFOSR MISSION

The Air Force Office of Scientific Research (AFOSR) is the Single Manager of the Air Force Defense Research Sciences Program (Program Element 61102F) and the primary Air Force agency for the extramural support of fundamental scientific research. The AFOSR is organizationally under the DCS/Science and Technology, Air Force Systems Command.

AFOSR awards grants and contracts for research in areas of science relevant to the needs of the Air Force. Research is selected for support from proposals received in response to the Broad Agency Announcement originating from scientists investigating problems involving the search for new knowledge and the expansion of scientific principles. Selection is on the basis of scientific potential for improving Air Force operational capabilities, originality, significance to science, the qualification of the principal investigators, and the reasonableness of the proposed budget.

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The summaries consist of two indexes and the abstracts. From one of the two indexes, locate the AD number of the report that is of interest to you. Use this number to locate the abstract of the report in the abstracts section. The first report submitted to DTIC during the quarter (the one with the lowest AD number) appears on the last page of the abstracts section. The last report submitted to DTIC during the quarter (the one with the highest DTIC number) appears on the first page of the abstracts section. The following terms will give you a brief description of the elements used in each summary of this report.

DTIC Report Bibliography - DTIC's brief description of a technical report.

Search Control Number - A number assigned by DTIC at the time a bibliography is printed.

AD Number - A number assigned to each technical report when received by the DTIC.

Field & Group Numbers - (appearing after the AD number) First number is the subject field and the second number after the slash is the particular group under that subject field.

Corporate Author/Performing Organization - The organization; e.g., college/university, company, etc., at which the research is conducted.

Title - The title of the technical report.

Descriptive Note - Gives the type of report; e.g., final, interim, etc., and the period of the time of the research.

Date - Date of the technical report.

Pages - Total number of pages contained in the technical report.

Personal Author - Person or persons who wrote the report.

Contract/Grant Number - The instrument control number identifying the contracting activity and funding year under which the research is initiated.

Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

Task Number - An alphanumeric number unique to a specific field of the main area of science; e.g., 2304 is the project number for mathematics and A3 is the task number for computational sciences.

Monitor Number - The number assigned to a particular report by the government agency monitoring the research. The number consists of the government monitor acronym, the present calendar year and the technical report assigned consecutively; e.g., AFOSR-TR-83-0001 is the first number used for the first technical report processed for Calendar Year 1983.

Supplementary Note - A variety of statements pertaining to a report. For example, if the report is a journal article, the supplementary note might give you the journal citation, which will include the name of the journal the article it appears in, and the volume number, date, and the page numbers of the journal.

Abstract - A brief summary describing the research of the report.

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SUBJECT INDEX

SUBJECT INDEX

- *ABSORPTION
Reprint: Memory-Induced Extra Resonances of Adsorbates.
AD-A198 211
Reprint: Absorption of Gaseous Iodine by Polythiophene Films and Powders.
AD-A198 218
Reprint: Collisional-Induced Absorption in Calcium Rare-Gas Collisions.
AD-A198 831
- *ABSORPTION SPECTRA
Monolayer and Langmuir-Blodgett Multilayer Surface and Spectral Studies of Poly-3-BCMU.
AD-A198 801
- *ACETYLCHOLINESTERASE
Behavioral Consequences of Neurotransmitter Regulation.*
AD-A200 374
- *ACETYLENE
Reprint: High Resolution Spectroscopic Studies of Small Molecules.
AD-A198 837
Development of Conducting Polymers of High Structural Strength.*
AD-A200 310
- *ACETYLENES
Polysilylated Unsaturated Molecules.*
AD-A198 492
- *ACOUSTIC SIGNALS
Research on the Statistics of Grain Lattice Echoes and Their Use in Grain Size Estimation and Grain Echo Suppression.*
AD-A198 811
- *ACOUSTIC WAVES
Reprint: The Inverse Scattering Problem for Time-Harmonic Acoustic Waves in an Inhomogeneous Medium.
AD-A200 335
- *ADAPTIVE CONTROL SYSTEMS
Reprint: On Adaptive Control of Stochastic Bilinear Systems.
AD-A198 074
Reprint: A Model Reference Adaptive Control Scheme for Pure-Feedback Nonlinear System.
AD-A198 388
Reprint: Adaptive Control of Stochastic Bilinear Systems.
AD-A198 387
Adaptive Control Techniques for Large Space Structures.*
AD-A200 208
- *ADATOMS
Reprint: Theory of Laser-Pulse-Induced Molecular Dynamics: Gas-Phase Molecular Collisions and Adatom Dynamics.
AD-A197 870
- *ADRENAL GLANDS
Biochemical Mechanisms Controlling Bioreactivity of Adrenal Chromaffin Cells.*
AD-A198 470
- *ADSORBATES
Proceedings of the Topical Meeting on the Microphysics of Surfaces, Beams, and Adsorbates (2nd) Held in Santa Fe, New Mexico on 16-18 February 1987.*
AD-A197 801
Reprint: Memory-Induced Extra Resonances of Adsorbates.
AD-A198 211
Reprint: Fragmentation of Molecular Adsorbates by Electron and Ion Bombardment: Methoxy Chemistry on Al(111).
AD-A198 729
- *ADSORPTION
Reprint: Size, Shape and Site Selectivities in the Photochemical Reactions of Molecules Adsorbed on Pentasil Zeolites.
AD-A197 753
Reprint: Studies of L-DOPA and
- Related Compounds Adsorbed from Aqueous Solutions at Pt(100) and Pt(111): Electron Energy-Loss Spectroscopy, Auger Spectroscopy, and Electrochemistry.
AD-A198 501
Reprint: Summary Abstract: The Adsorption and Decomposition of Molybdenum Hexacarbonyl on Mo and Si Surfaces.
AD-A200 358
- *ADVERSE CONDITIONS
Topical Meeting on Optics in Adverse Environments: Summaries of Papers Presented at the Optics in Adverse Environments Topical Meeting Held in Albuquerque, New Mexico on 11-12 February 1987.
Technical Digest Series. Volume 8.*
AD-A187 119
- *AEROSPACE SYSTEMS
Processability and High Temperature Behavior of Emerging Aerospace Alloys.*
AD-A198 928
- *AIR
Aerodynamic and Kinetic Processes in Flames.*
AD-A198 474
- *AIR COOLED
Interface Stability between Two Gas Streams of Different Density in a Curved Flow.*
AD-A198 874
- *AIR FORCE RESEARCH
Air Force Research Initiation Program. 1986 Technical Report. Volume 1.*
AD-A198 820
Air Force Research Initiation Program. 1986 Technical Report. Volume 2.*
AD-A198 821
Air Force Research Initiation Program. 1986 Technical Report. Volume 3.*

UNCLASSIFIED

AD-A198 822

*ALANINES

Reprint: Studies of L-DOPA and Related Compounds Adsorbed from Aqueous Solutions at Pt(100) and Pt(111): Electron Energy-Loss Spectroscopy, Auger Spectroscopy, and Electrochemistry.
AD-A198 501

*ALGEBRA

Reprint: Nonlinear Discrete-Time Systems: Algebraic Theory.
AD-A197 921

*ALGORITHMS

Fault Tolerant Parallel Implementations of Iterative Algorithms for Optimal Control Problems.*
AD-A198 041

Algorithms for Robust

Identification and Control of Large Space Structures. Phase 1.*
AD-A198 130
Robust Algorithms for Detecting a Change in a Stochastic Process with Infinite Memory.*

AD-A198 290

Parallel Algorithms for PDE solvers.*
AD-A199 625

*ALIPHATIC HYDROCARBONS

Reprint: Vector Correlations in the Photodissociation of CH3I, OCS, and Glyoxal.
AD-A198 332

*ALKALI METAL COMPOUNDS

Reprint: A Convenient Synthesis of Alkali Metal Selenides and Diselenides in Tetrahydrofuran and the Reactivity Differences Exhibited by These Salts toward Organic Bromides. Effect of Ultrasound.
AD-A197 889

*ALLOYS

Crystal Growth and Mechanical Properties of Semiconductor Alloys.*
AD-A198 153

Processability and High Temperature Behavior of Emerging Aerospace Alloys.*
AD-A199 828

Semiconductor Alloy Engineering for High-Speed Devices.*
AD-A200 358

High Temperature Mechanical Testing Facilities.*
AD-A200 545

*ALUMINATES

Reprint: Aspects of the Chemistry of Water in Ambient-Temperature Chloraluminate Ionic Liquids: 170 NMR Studies.
AD-A198 225

*ALUMINUM COMPOUNDS

Reprint: Electrochemical and Spectroscopic Studies of 1,4-Benzoquinone in Ambient Temperature Chloraluminate Ionic Liquids.
AD-A198 559

*AMINES

The Role of Central Monoamergic Systems in Arousal and Selective Attention.*
AD-A198 288

*AMINO ACIDS

Reprint: Studies of L-DOPA and Related Compounds Adsorbed from Aqueous Solutions at Pt(100) and Pt(111): Electron Energy-Loss Spectroscopy, Auger Spectroscopy, and Electrochemistry.
AD-A198 501

*AMMONIA

Reprint: DIET in the Second Layer: An ESDIAD (Electron Stimulated Desorption Ion Angular Distribution) Study of NH3 on a CO Layer on Ni(111) and Ni(110).
AD-A197 877

*ANALYSIS OF VARIANCE

Reprint: The Effects of Variance Function Estimation on Prediction and Calibration. An Example.
AD-A199 821
Reprint: Variance Function Estimation.
AD-A199 822

*ANALYZERS

Thermal Analysis System (DSC, TGA, TMA) for Oxidation and Phase Transformation Studies of Alloys with Metastable Phase.*
AD-A198 420

*ANHYDRIDES

Investigations of the Optical and Electronic Properties of Crystalline Organic Materials.*
AD-A200 074

*ANIONS

Theoretical Studies of Kinetic Mechanisms of Negative Ion Formation in Plasmas.*
AD-A199 994

*ANISOTROPY

Small Strain Response of Random Arrays of Elastic Spheres Using a Nonlinear Distinct Element Procedure.*
AD-A198 281
Anisotropy and Stress Path Effects in Clays with Applications to the Pressuremeter Test.*
AD-A198 628

*ANTIDOTES

Reprint: An Ab Initio Study of the Structure and Bonding of Pralidoxime and Its Conjugate Base.
AD-A200 532

*ANTIQUINONE

Reprint: Synthesis of Trifluorosilyl Organometallic Complexes from Trifluorosilyl Radicals and Metal Atoms.
AD-A198 580

SUBJECT INDEX-2
UNCLASSIFIED EVJ00F

ALA-ANT

- *APLYSIA
Regulation of Voltage-Dependent
Channel Function.*
AD-A200 375
- *APPROXIMATION(MATHEMATICS)
Reprint: On a Joint Strong
Approximation Theorem for Record
and Inter-Record Times.
AD-A198 370
- *AROMATIC COMPOUNDS
Novel Liquid Crystals - Polymers
and Monomers - As Nonlinear Optical
Materials.*
AD-A200 075
Reprint: Synthesis of Side Chain
Liquid Crystal Polymers for
Nonlinear Optics.
AD-A200 386
- *AROMATIC HYDROCARBONS
Reprint: Potentially Aromatic
Metalloacycles.
AD-A197 765
Reprint: An AM1 Study of the
Cope Rearrangements of Bublivalene,
Barbaralene, Semibublivalene, and
Derivatives of Semibublivalene.
AD-A198 021
- *ARRAYS
Small Strain Response of Random
Arrays of Elastic Spheres Using a
Nonlinear Distinct Element
Procedure.*
AD-A188 281
Millimeter Wave Generation Using
Josephson Junction Arrays.*
AD-A200 259
- *ARSINES
Use of D2 to Elucidate OMVPE
(organometallic Vapor Phase
Epitaxial) Growth Mechanisms.*
AD-A199 841
- *ARTIFICIAL INTELLIGENCE
Research Instrumentation for
Computer Vision, Image
Understanding and Optical
- Computing.*
AD-A198 578
Optics and Symbolic Computing.*
AD-A200 564
- *ARTIFICIAL SATELLITES
Investigation of Liquid Sloshing
in Spin-Stabilized Satellites.*
AD-A199 828
- *ASSAYING
Variance Functions and the
Minimum Detectable Concentration in
Assays.*
AD-A200 303
- *ASYMPTOTIC NORMALITY
Reprint: Asymptotic Structure
and Extinction of Diffusion Flames
with Chain Mechanism.
AD-A200 332
- *ATMOSPHERE MODELS
Studies of Internal Wave/Mean
Flow Interactions.*
AD-A199 948
- *ATMOSPHERIC TEMPERATURE
Reprint: Equatorial Semiannual
Oscillation in Zonally Averaged
Temperature Observed by the Nimbus
7 SAMS (Stratospheric and
Mesospheric Sounder) and LIMS (Limb
Infrared Monitor of the
Stratosphere).
AD-A200 567
Reprint: Equatorial Semiannual
Oscillation in Zonally Averaged
Temperature Observed by the Nimbus
7 SAMS (Stratospheric and
Mesospheric Sounder) and LIMS (Limb
Infrared Monitor of the
Stratosphere).
AD-A200 567
- *ATOMS
Reprint: Desorption of a Two-
State System: Laser Probing of
Gallium Atom Spin-Orbit States from
Silicon (100).
AD-A199 235
- Yne Physics of Spin Polarized
Atomic Vapors.*
AD-A188 980
- *ATTENTION
Preattentive and Attentive
Visual Information Processing.*
AD-A197 870
The Role of Central
Monoaminergic Systems in Arousal
and Selective Attention.*
AD-A198 288
Perceptual Factors in Workload:
A Neuromagnetic Study.*
AD-A188 487
Individual Differences in
Attention.*
AD-A188 824
- *ATTITUDE CONTROL SYSTEMS
Algorithms for Robust
Identification and Control of Large
Space Structures. Phase 1.*
AD-A188 130
- *AUDITORY PERCEPTION
Perceptual Factors in Workload:
A Neuromagnetic Study.*
AD-A188 487
Information Processing of
Complex Sounds in the Anteroventral
Cochlear Nucleus.*
AD-A188 576
Complex Auditory Signals.*
AD-A198 832
Mechanisms Mediating the
Perception of Complex Acoustic
Patterns.*
AD-A200 530
- *AUDITORY SIGNALS
Complex Auditory Signals.*
AD-A199 832
- *AUTOMATA
Investigations of the Motion of
Discrete-Velocity Gases by Cellular
Automata.*
AD-A200 221
- *BAND SPECTRA

SUBJECT INDEX-3
UNCLASSIFIED EVJQOF

APL-EAN

UNCLASSIFIED

Reprint: Electronic Assignments
of the Violet Bands of Sodium.
AD-A199 839

*BARIUM
Scanning Tunneling Microscopy as
a Surface Chemical Probe.*
AD-A199 922

*BAYES THEOREM
Detection of Change Points Using
Rank Methods.*
AD-A198 406

*BENZENE COMPOUNDS
Reprint: Potentially Aromatic
Metallocycles.
AD-A197 765

Reprint: Photochemistry of
Benzocyclobutene.
AD-A198 507
Reprint: A New Route to 1,4-
Disilabenzenes and 1,4-
Disilabarrelenes.
AD-A200 207

*BENZYL RADICALS

Reprint: Use of Electron Spin
Resonance Spectroscopy to Study the
Photochemistry of Adsorbed Dibenzy
Ketone on Porous Silica.
AD-A198 220

*BERYLLIUM

Reprint: Effects of Autoionizing
Resonances on Electron-Impact
Excitation Rates for Be-Like Ions.
AD-A199 407

*BETATRONS

Investigation of Acceleration
and Densification of Electrons
Utilizing Travelling Magnetic
Waves.*
AD-A197 700

*BINARY ALLOYS

Fundamental Understanding of the
Intrinsic Ductility in Nickel-Base
L1 sub 2 Type Alloys.*
AD-A197 605

*BIOCHEMISTRY

Biochemical Mechanisms
controlling Bioreactivity of
Adrenal Chromaffin Cells.*
AD-A198 471

*BIOLOGICAL RHYTHMS

Society for Research on
Biological Rhythms (1st) Held on
May 11-14, 1988 in Charleston,
South Carolina.*
AD-A200 134

*BIOSYNTHESIS

Reprint: Mechanism of Chain
Extension Step in Biosynthesis.
AD-A198 138

*BIREFRINGENCE

Reprint: Frank Elastic Constants
and Leslie-Ericksen Viscosity
Coefficients of Nematic Solutions
of a Rodlike Polymer.
AD-A198 481

*BISMUTH COMPOUNDS

Snuffie Flight Test of an
Advanced Gamma-Ray Detection
System.*
AD-A198 399

*BLAST LOADS

Blast Induced Liquefaction of
Soils: Laboratory and Field Tests.*
AD-A199 985

*BLOOD PROTEINS

Interaction of Hydrophobic
Molecules with Heme Proteins.*
AD-A198 747

*BLOWOFF

Carbon Monoxide and Turbulence-
Chemistry Interactions: Blowoff and
Extinction of Turbulent Jet
Diffusion Flames.*
AD-A199 581

*BONDING

High Temperature Properties of
Ceramic/Carbon Systems in an

Oxidizing Environment.*

AD-A200 254

*BORANES

Reprint: A New Route to 1,4-
Disilabenzenes and 1,4-
Disilabarrelenes.
AD-A200 207

*BORON COMPOUNDS

Reprint: AM1 Calculations for
Compounds Containing Boron.
AD-A200 196

*BOUNDARY LAYER

Management and Control of
Unsteady and Turbulent Flows.*
AD-A198 091

Constitutive Modelling of Joints
under Cyclic Loading. Part 2.
Further Development of Hierarchical
Plasticity Model for Joints.*
AD-A200 233

*BOUNDARY LAYER FLOW

Studies of Unsteadiness in
Boundary Layers.*
AD-A199 989

*BRAIN

Synaptic Plasticity and Memory
Function.*
AD-A198 473
Bioreactivity: Studies on a
Simple Brain Stem Reflex in
Behaving Animals.*
AD-A199 404

*BREMSSTRAHLUNG

Investigation of Acceleration
and Densification of Electrons
Utilizing Travelling Magnetic
Waves.*
AD-A197 700

*BRONZE

Research on Sputtering of
Ferroelectric Thin Films.*
AD-A197 899

*BROWNIAN MOTION

SUBJECT INDEX-4
UNCLASSIFIED EVJ00F

BAR-BRO

Sunset over Brownistan.*

AD-A198 443

*BUTANES

Reprint: Theoretical Studies of
Silabicyclobutenes and
Silacyclobutenes, $CnSi(4-n)H_6$ ($n =$
0-4).
AD-A197 953

*BUTENES

Reprint: Theoretical Studies of
Silabicyclobutenes and
Silacyclobutenes, $CnSi(4-n)H_6$ ($n =$
0-4).
AD-A197 953

*CADMIUM TELLURIDES

MBE Growth, Characterization and
Electronic Device Processing of
 $HgCdTe$, $HgZnTe$, Related
Heterojunctions and $HgCdTe$ - $CdTe$
Superlattices.*

AD-A197 752

MBE Growth, Characterization and
Electronic Device Processing of
 $HgCdTe$, $HgZnTe$, Related
Heterojunctions and $HgCdTe$ - $CdTe$
Superlattices.*

AD-A198 421

*CALCIUM

Regulation of Voltage-Dependent
Channel Function.*

AD-A200 375

*CALIBRATION

A Quick and Easy Multiple Use
Calibration Curve Procedure.*

AD-A198 227

*CAMERAS

Non Contacting Evaluation of
Strains and Cracking Using Optical
and Infrared Imaging Techniques.*

AD-A200 397

*CARBENES

Reprint: Chemistry of
Polynuclear Metal Complexes with
Bridging Carbene or Carbonyl

Ligands. Part 75. Reactions of
Octacarbonyldicobalt with the Salts
(X)(W(triple bond CR)(CO)₂(eta 5-
C₂B₉H₉Me₂)) (X = NEt₄ or PPh₄; R =
Me, Ph, C₆H₄Me-2, or C₆H₄Me-4);
Crystal Structure of (PPh₄)(Co₂W(mu
sub 3-Cp)(CO)₈(eta 5-
C₂B₉H₉Me₂)). 0.5C₄H₂Cl₂.
AD-A200 085

*CARBON

Reprint: Lattice Vibrations in
Thin-Film Carbon: Electron-Rayleigh-
Wave Interaction.
AD-A198 268

Transient Behaviors in Chemical

Reactions: Nanosecond Infrared

Spectroscopy, Chemically Pumped

Visible and Near-IR Lasers.*

AD-A198 484

*CARBON CARBON COMPOSITES

Reprint: Electronic and
Structural Studies of Carbon/Carbon
Composites.
AD-A198 007

*CARBON FIBERS

Reprint: Intercalation and
Electrical Properties of Highly
Ordered Graphite Fibers.
AD-A198 508

Sub-Micron Carbon Filaments for

Optical Applications.*

AD-A198 878

*CARBON MONOXIDE

Reprint: DIET in the Second
Layer: An ESDIAD (Electron
Stimulated Desorption Ion Angular
Distribution) Study of NH₃ on a CO
Layer on Ni(111) and Ni(110).
AD-A197 870

Photochemical Disproportionation
Reactions of the W₂(CO)₁₀(2-) and
Fe₂(CO)₉(2-) Complexes.*

AD-A197 900

Reprint: Electron Stimulated

Desorption from CO Chemisorbed on

Pt(111): A Dynamical Study of

Positive Ion and Metastable CO

emission.

AD-A188 729

*CARBONYL COMPOUNDS

Reprint: State-Selective Studies
of Yields R, V Energy Transfer:
The W + CO System.
AD-A188 373

Reprint: Dialkylamino Phosphorus

Metal Carbonyls. 4. Novel

Phosphorus-Bridging Carbonyl

Derivatives and Triphosphine

Derivatives from Reactions of

Tetracarbonylferrate(-II) with

(Dialkylamino)dichlorophosphines 1-
4.
AD-A188 564

*CARBOXYL GROUPS

Investigations of the Optical
and Electronic Properties of
Crystalline Organic Materials.*

AD-A200 074

*CATALYSTS

Microstructure and Properties of
Catalysts Symposium Held in Boston,
Massachusetts on November 30-
December 3, 1987. Materials
Research Society Symposium
Proceedings. Volume 111.*
AD-A187 253

*CATALYTIC CRACKING

Microstructure and Properties of
Catalysts Symposium Held in Boston,
Massachusetts on November 30-
December 3, 1987. Materials
Research Society Symposium
Proceedings. Volume 111.*
AD-A187 253

*CATIOWS

Reprint: Simultaneous EPR
(Electron Paramagnetic Resonance)
Electrochemical Measurements on
Polychloroethene in Ambient Temperature
Ionic Liquids.
AD-A188 137

*CAVITY RESONATORS

SUBJECT INDEX-5

UNCLASSIFIED EVJ00F

BUT-CAV

UNCLASSIFIED

Superconducting Electronic Film Structures.*
AD-A200 534

*CEMENTS

Microstructure, Porosity and Mechanical Property Relationships of Calcium-Silicate-Hydrate.*
AD-A200 120

*CERAMIC COATINGS

Optical Fiber Science and Technology: Novel Fibers and Fiber Sensors.*
AD-A200 311

*CERAMIC MATERIALS

Bonding at Metal-Ceramic Interfaces in Hybrid Materials.*
AD-A197 928
Study of High Temperature Failure Mechanisms in Ceramics.*
AD-A198 375

A New Process for Final

Densification of Ceramics.*

AD-A199 959

Ceramics Derived from Organometallic Polymers.*
AD-A200 118

Mechanistic Studies of Pressure-Assisted Superplasticity of Structural Ceramics.*
AD-A200 202

Chemical Processing of Structural Ceramics and Composites.*
AD-A200 380

*CHANNELS

Semiconductor Alloy Engineering for High-Speed Devices.*
AD-A200 356

*CHARGED PARTICLES

The University of New Hampshire Vacuum Chamber and Charged Particle Calibration Source.*
AD-A199 623

*CHEMICAL BONDS

Reprint: Line Shape of an Atom-

Crystal Bond.
AD-A200 332

*CHEMICAL DISSOCIATION

Reprint: Femtosecond Real-Time Observation of Wave Packet Oscillations (Resonance) in Dissociation Reactions.
AD-A197 717

*CHEMICAL ENGINEERING

Chemical Processing of Structural Ceramics and Composites.*
AD-A200 380

*CHEMICAL REACTIONS

Reprint: Ultrafast Laser Spectroscopy of Chemical Reactions.
AD-A198 328
Reprint: AM1 Calculations for Compounds Containing Boron.
AD-A200 198

*CHEMISORPTION

Reprint: Dynamics of Chemisorption/Scattering of Atomic Hydrogen on Partially Covered Si(111) Surfaces.
AD-A198 297

Reprint: Electron Stimulated Desorption from CO Chemisorbed on Pt(111): A Dynamical Study of Positive Ion and Metastable CO Emission.
AD-A199 729

*CHLORIDES

Reprint: The Chemistry of Water in Ambient-Temperature Chloraluminate Ionic Liquids: NMR studies.
AD-A198 324

Reprint: Removal of Protons from Ambient-Temperature Chloroaluminate Ionic Liquids.
AD-A198 451

Reprint: Electrochemistry of Molybdenum Chloride Dimers in a Basic Ambient-Temperature Molten Salt.

AD-A198 562

*CHLORINATED HYDROCARBONS

Validation and Application of Pharmacokinetic Models for Interspecies Extrapolations in Toxicity Risk Assessments of Volatile Organics.*
AD-A200 034

*CHLORINE COMPOUNDS

Reprint: Aspects of the Chemistry of Water in Ambient-Temperature Chloraluminate Ionic Liquids: 170 NMR Studies.
AD-A198 225

*CHLORDETHANES

Validation and Application of Pharmacokinetic Models for Interspecies Extrapolations in Toxicity Risk Assessments of Volatile Organics.*
AD-A200 034

*CIRCADIAN RHYTHMS

Pharmacological Resetting of the Circadian Sleep-Wake Cycle.*
AD-A200 246

*CLATHRATE COMPOUNDS

Reprint: Transannular Cyclizations in the Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9))undecane-8,11-Dione System: A reinvestigation.
AD-A198 026

*CLAY

Anisotropy and Stress Path Effects in Clays with Applications to the Pressuremeter Test.*
AD-A199 628

*COBALT

Reprint: Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 75. Reactions of Octacarbonyldicobalt with the Salts (X)(W(triple bond CR)(CO)2(eta 5-

SUBJECT INDEX-8
UNCLASSIFIED EVJ00F

CEM-C08

C289H9Me2)) (X = NEt4 or PPh4; R = Me, Ph, C6H4Me-2, or C6H4Me-4); Crystal Structure of (PPh4)(Co2W(mu sub 3-CPh)(CO)8(eta 5-C289H9Me2)). 0.5CH2Cl2.
AD-A200 065

*COCHLEAR NERVE
Information Processing of Complex Sounds in the Anteroventral Cochlear Nucleus.*
AD-A198 576

*COGNITION
The Role of Central Monoaminergic Systems in Arousal and Selective Attention.*
AD-A198 298

*COLLISIONS
Reprint: Collisional-Induced Absorption in Calcium Rare-Gas Collisions.
AD-A199 831

*COLLOIDS
Reprint: Dynamics of Interaction between a 1,9-Biradical and Lanthanide Ions.
AD-A198 068

*COLOR VISION
Higher Order Mechanisms of Color Vision.*
AD-A198 093

*COMBUSTION
Radiative Augmented Combustion.*
AD-A197 300
Reprint: Pump/Probe Method for Fast Analysis of Visible Spectral Signatures Utilizing Asynchronous Optical Sampling.
AD-A198 318

Carbon Monoxide and Turbulence-Chemistry Interactions: Blowoff and Extinction of Turbulent Jet Diffusion Flames.*
AD-A198 861

Reprint: Digital Imaging of Laser-Ignited Combustion.

AD-A200 329
Laser Thermal Propulsion.*
AD-A200 553

*COMMUNICATION AND RADIO SYSTEMS
Reprint: A New Algorithm for Performance Analysis of Communication Systems.
AD-A197 780

*COMMUNICATIONS NETWORKS
Reprint: A New Algorithm for Performance Analysis of Communication Systems.
AD-A197 780

*COMPLEX IONS
Powerful Photogenerated Reducing Agents.*
AD-A197 949

*COMPOSITE MATERIALS
Analytical and Experimental Characterization of Damage Processes in Composite Laminates.*
AD-A198 068

Cumulative Damage Modelling in Composite Laminates.*
AD-A198 282
Crazing in Polymeric and Composite Systems.*
AD-A198 372

Fundamentals of Interfacial Strength in Composite Materials.*
AD-A198 626
Nonlinear Dynamic Responses of Composite Rotor Blades.*
AD-A200 145

*COMPUTATIONS
Reprint: A Computational Method for General Higher Index Nonlinear Singular Systems of Differential Equations.
AD-A198 237
Research in Optical Symbolic Computing Tasks.*
AD-A199 998

*COMPUTER ARCHITECTURE
Optical Symbolic Processor for

Expert System Execution.*
AD-A197 888
Ordering Methods for Sparse Matrices and Vector Computers.*
AD-A198 281
Approximate Evaluation of Reliability and Availability Via Perturbation Analysis.*
AD-A198 940

*COMPUTER PROGRAMMING
Symbolic Processor Based Models of Neural Networks.*
AD-A200 200
Massive Symbolic Mathematical Computations and Their Applications.*
AD-A200 253

*COMPUTERIZED SIMULATION
Computer Simulation of Radiation Generation from Relativistic Electron Beams.*
AD-A199 827
Role of Retinocortical Processing in Spatial Vision.*
AD-A200 198

*COMPUTERS
Spectroscopic and Light Scattering Instrumentation Proposal.*
AD-A199 991

*CONCRETE
Strength and Deformation of Confined and Unconfined Concrete Under Axial Dynamic Loading.*
AD-A199 930
Constitutive Modelling of Joints under Cyclic Loading. Part 4. Development of Simulated Rock-Like Material and Testing.*
AD-A200 235

*CONDITIONING(LEARNING)
Neurophysiological Research Supporting the Investigation of Adaptive Network Architectures.*
AD-A199 873

UNCLASSIFIED
SUBJECT INDEX-7
EVJ00F

COC-CON

UNCLASSIFIED

*CONFIDENCE LEVEL
A Quick and Easy Multiple Use
Calibration Curve Procedure.*
AD-A198 227

*CONFIDENCE LIMITS
A Quick and Easy Multiple Use
Calibration Curve Procedure.*
AD-A198 227
Reprint: Test of Equal Gamma-
Distribution Means with Unknown and
Unequal Shape Parameters.
AD-A200 368
Reprint: A Confidence Interval
for Treatment Component-of-Variance
with Applications to Differences in
Means of Two Exponential
Distributions.
AD-A200 540

*CONTAMINANTS
Interactions Among Drinking and
Ground Water Contaminants on Renal
and Hepatic Function.*
AD-A197 075

*CONTROL SYSTEMS
Reprint: Adaptive Policies for
Discrete-Time Stochastic Control
Systems with Unknown Disturbance
Distribution.
AD-A198 069
Reprint: Affine-Feedback
Stabilization of Piecewise-Linear
Hypersurface Systems.
AD-A198 317
Reprint: Remarks on Smooth
Feedback Stabilization of Nonlinear
Systems.
AD-A198 385

*CONTROL THEORY
Reprint: Unified Optimal
Projection Equations for
Simultaneous Reduced-Order, Robust
Modelling Estimation and Control.
AD-A198 381
Reprint: The Optimal Projection
Equations with Peterse-Williot
Bounds: Robust Stability and
Performance via Fixed-Order Dynamic

Compensation for Systems with
Structured Real-Valued Parameter
Uncertainty.
AD-A198 398
Reprint: Immersion and Immersion
by Nonsingular Feedback of a
Discrete-Time Nonlinear System Into
a Linear System.
AD-A198 557

*CONVERGENCE
Optimal Rates of Convergence for
Deconvolving a Density.*
AD-A197 748

*COOLING
A New Approach to the Analysis
and Control of Large Space
Structures. Phase 1.*
AD-A198 143

*COPOLYMERIZATION
New Experimental Challenges in
Elemental Fluorine Chemistry; an
Emerging Technology.*
AD-A198 371

*CORRELATION
On a Correlation Inequality and
Its Applications.*
AD-A198 295

*COUNTERMEASURES
Applications of Operator Theory
to Maximum Entropy Problems.*
AD-A200 568

*COUPLING(INTERACTION)
Reprint: A Dimer Ketone Formed
via Fe(CO)5-Promoted Coupling of 7-
Phenoxybiphenylene to Carbon
Monoxides.
AD-A197 384

*COVARIANCE
Identifying Nonlinear Covariate
Effects in Semiparametric
Regression Models.*
AD-A197 323
Covariance Analysis in
Generalized Linear Measurement

Error Models.*
AD-A197 681

*CRACK PROPAGATION
Advanced Modeling for Fatigue
Growth of Small Surface Cracks.*
AD-A198 077

*CRACKING(FRACTURING)
Non Contacting Evaluation of
Strains and Cracking Using Optical
and Infrared Imaging Techniques.*
AD-A200 397

*CRACKS
Integration of Statistical and
Physical Models of Short Fatigue
Crack Growth.*
AD-A197 917
Advanced Modeling for Fatigue
Growth of Small Surface Cracks.*
AD-A198 077

*CRATERS
Geotechnical Centrifuge Modeling
of Explosion Induced Craters - A
check for Scaling Effects.*
AD-A200 290

*CRAZING
Crazing in Polymeric and
Composite Systems.*
AD-A198 372

*CREEP TESTS
High Temperature Mechanical
Testing Facilities.*
AD-A200 565

*CROSS CORRELATION
Fundamental Quantum 1/F Noise in
Ultrasmall Semiconductor Devices
and their Optimal Design
Principles.*
AD-A198 462

*CRYOGENICS
Topical Meeting on Optics in
Adverse Environments: Summaries of
Papers Presented at the Optics in
Adverse Environments Topical

SUBJECT INDEX-8
UNCLASSIFIED EVJ00F

CON-CRY

Meeting Held in Albuquerque, New Mexico on 11-12 February 1987.
Technical Digest Series Volume 8.*
AD-A197 119

*CRYSTAL GROWTH
Crystal Growth and Mechanical Properties of Semiconductor Alloys.*
AD-A198 153

*CRYSTAL LATTICES
Defect Reduction in Epitaxial Growth Using Superlattice Buffer Layers.*
AD-A198 409

*CRYSTAL STRUCTURE
Reprint: Intermolecular Interactions and Crystal Stabilities of Tetraethiavalene-Tetracyanoquinodimethane.
AD-A200 361

*CRYSTALS
Single Crystal GaAs Stoichiometry Measurements Through Double Crystal Diffractometry.*
AD-A126 593L

*CURRENTS
Regulation of Voltage-Dependent Channel Function.*
AD-A200 375

*CYANOGEN
Reprint: Reductive Amination of Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9))undecane-8,11-dione.
AD-A198 222
Reprint: Time Dependent Absorption of Fragments During Dissociation.
AD-A198 329

*CYCLIC COMPOUNDS
Synthesis of New Polynitropolyhedranes.*
AD-A198 320

*CYCLIC TESTS

Constitutive Modelling of Joints under Cyclic Loading. Part 3.
Cyclic Multi Degree-of-Freedom Shear Device with Pore Water Pressure.*
AD-A200 234

*CYCLOBUTANES
Reprint: Theoretical Studies of Silabicyclobutanes and Silacyclobutenes, $CnSi(4-n)H_6$ ($n = 0-4$).
AD-A197 853

*CYCLOBUTENES
Reprint: Photochemistry of Benzocyclobutene.
AD-A198 507

*CYCLOPENTENES
Reprint: Potentially Aromatic Metallacyclics.
AD-A197 785
Reprint: Anionic Ring-Opening Polymerization of Sila- and Germacyclopent-3-enes.
AD-A197 874

*CYCLOTRONS
Computer Simulations of Radiation Generation from Relativistic Electron Beams.*
AD-A199 627

*CYSTEINE
Reprint: Studies of L-DOPA and Related Compounds Adsorbed from Aqueous Solutions at Pt(100) and Pt(111): Electron Energy-Loss Spectroscopy, Auger Spectroscopy, and Electrochemistry.
AD-A198 501

*DAMAGE
Cumulative Damage Modelling in Composite Laminates.*
AD-A198 282
Intense XUV Radiation Sources.*
AD-A200 262

*DATA ACQUISITION

Optical Acquisition, Image and Data Compression.*
AD-A188 993

*DATA COMPRESSION
Optical Acquisition, Image and Data Compression.*
AD-A199 993

*DATA PROCESSING EQUIPMENT
Non Contacting Evaluation of Strains and Cracking Using Optical and Infrared Imaging Techniques.*
AD-A200 397

*DATA REDUCTION
Variance Functions and the Minimum Detectable Concentration in Assays.*
AD-A200 203

*DECANES
Synthesis of New Polynitropolyhedranes.*
AD-A198 320

*DENDRIMERIC STRUCTURE
Synaptic Plasticity and Memory Function.*
AD-A198 473

*DESORPTION
Reprint: DIET in the Second Layer: An ESDIAD (Electron Stimulated Desorption Ion Angular Distribution) Study of NH_3 on a CO Layer on $Ni(111)$ and $Ni(110)$.
AD-A197 870

Reprint: Theory of Laser-Pulse-Induced Molecular Dynamics: Gas-Phase Molecular Collisions and Adbond Dynamics.
AD-A197 871

Electronic Interactions of Electrons, Photons, and Atoms with Material Surfaces.*
AD-A198 626

Reprint: Electron Stimulated Desorption from CO Chemisorbed on Pt(111): A Dynamical Study of Positive Ion and Metastable CO

SUBJECT INDEX-9
UNCLASSIFIED EVJ00F

CRY-DES

UNCLASSIFIED

emission.
AD-A199 729

*DETECTION

Two Photon Detection Techniques
for Atomic Fluorine.*
AD-A199 955

*DETECTORS

Shuttle Flight Test of an
Advanced Gamma-Ray Detection
System.*
AD-A198 399
The University of New Hampshire
Vacuum Chamber and Charged Particle
Calibration Source.*
AD-A199 823

*DEUTERIUM

Use of D2 to Elucidate DMVPE
(organometallic Vapor Phase
Epitaxial) Growth Mechanisms.*
AD-A199 841

*DIAGNOSIS(GENERAL)

Reprint: Pump/Probe Method for
Fast Analysis of Visible Spectral
Signatures Utilizing Asynchronous
Optical Sampling.
AD-A198 318
The National Diagnostic Facility
under Construction.*
AD-A198 901

*DIAGNOSTIC EQUIPMENT

Equipment to Upgrade the
Facilities of the IIT (Illinois
Institute of Technology) Fluid
Dynamics Research Center.*
AD-A198 084

*DIATOMIC MOLECULES

Reprint: Photoionization of the
Valence Orbitals of OH.
AD-A198 331
State-Specific Energy Transfer
in Diatomic Radicals.*
AD-A200 357

*DIAZEPAM

Pharmacological Reserching of the

Circadian Sleep-Wake Cycle.*
AD-A200 246

*DICHROISM

Reprint: Circular Dichroism in
Photoelectron Angular Distributions
from Two-Color (1+1)REMPI
(resonantly Enhanced Multiphoton
Ionization) of NO.
AD-A198 387

*DIENE SYNTHESIS

Reprint: Diels-Alder Reactions
of 1,1-dimethyl-2,3,4,5-tetraphenyl-
1-silacyclopentadiene, 1,1-
dimethyl-2,5-diphenyl-1-
silacyclopentadiene and 1,1-
dimethyl-3,4-diphenyl-1-
silacyclopentadiene with Maleic
Anhydride; Kinetic Measurements.
AD-A200 365

*DIENES

Reprint: An AM1 Study of the
Cope Rearrangements of Bullvalene,
Barbaralane, Semibullvalene, and
Derivatives of Semibullvalene.
AD-A198 021
Reprint: Structure of a Bis(eta4-
exocyclic-1,3-diene)Fe(CO)3
Complex.
AD-A198 319
Reprint: A New Route to 1,4-
Disilabenzenes and 1,4-
Disilaborelenes.
AD-A200 207

*DIFFERENTIAL EQUATIONS

Reprint: A Computational Method
for General Higher Index Nonlinear
Singular Systems of Differential
Equations.
AD-A199 237
A Langevin-Type Stochastic
Differential Equation on a Space of
Generalized Functionals.*
AD-A199 609

*DIFFRACTOMETERS

Single Crystal GaAs
Stoichiometry Measurements Through

Double Crystal Diffractometry.*
AD-B126 593L

*DIFFUSION

Proceedings of the Topical
Meeting on the Microphysics of
Surfaces, Beams, and Adsorbates
(2nd) Held in Santa Fe, New Mexico
on 16-18 February 1987.*
AD-A197 801
Diffusion at Interfaces:
Microscopic Concepts. Proceedings
of a Workshop Held in Campobello
Island, Canada on August 18-22
1987. Springer Series in Surface
Sciences. Volume 12.*
AD-A197 759
Carbon Monoxide and Turbulence-
Chemistry Interactions: Blowoff and
Extinction of Turbulent Jet
Diffusion Flames.*
AD-A199 981

*DIMERS

Reprint: A Dimer Ketone Formed
via Fe(CO)5-Promoted Coupling of 7-
Phenoxynorbornadiene to Carbon
Monoxide.
AD-A197 884
Photochemical Disproportionation
Reactions of the W2(CO)10(2-) and
Fe2(CO)8(2-) Complexes.*
AD-A197 900
Reprint: Electrochemistry of
Molybdenum Chloride Dimers in a
Basic Ambient-Temperature Molten
Salt.
AD-A198 562

*DISCONTINUITIES

Constitutive Modelling of Joints
under Cyclic Loading. Part 2.
Further Development of Hierarchical
Plasticity Model for Joints.*
AD-A200 233

*DISCRETE DISTRIBUTION

Reprint: Remarks on
Discretization and Linear
Equivalence of Continuous Time
Nonlinear Systems.

SUBJECT INDEX-10
UNCLASSIFIED EVJ00F

DET-DIS

AD-A198 388

***DISCRIMINATE ANALYSIS**

Discrimination Analysis when the
Variables are Grouped and Observed
in Sequential Order.*
AD-A198 405

***DISPERSION HARDENING**

Dispersion Strengthening of High
Temperature Niobium Alloys.*
AD-A199 958

***DISPLAY SYSTEMS**

Preattentive and Attentive
Visual Information Processing.*
AD-A197 670

***DISPROPORTIONATION**

Photochemical Disproportionation
Reactions of the $W(CO)_9O(2-)$ and
 $Fe_2(CO)_8(2-)$ Complexes.*
AD-A197 900

***DISSOCIATION**

Reprint: Theory of Nonadiabatic
Flame Propagation in Dissociation
Equilibrium.
AD-A198 019
Reprint: Vector Correlations in
the Photodissociation of $CrCl_3$, OCS,
and Glyoxal.
AD-A198 332

***DODECANE**

Reprint: Dynamics of Interaction
between a 1,9-Biradical and
Lanthanide Ions.
AD-A198 068

***DOPAMINE**

Reprint: Studies of L-DOPA and
Related Compounds Adsorbed from
Aqueous Solutions at $Pt(100)$ and
 $Pt(111)$: Electron Energy-Loss
Spectroscopy, Auger Spectroscopy,
and Electrochemistry.
AD-A198 501

***DOPING**

Reprint: Thermodynamic Stability

Reversible Uptake of Electrically
Active Dopants in Conducting
Polymers: Iodine in Polythiophene.
AD-A198 576

***DYE LASERS**

Reprint: Pump/Probe Method for
Fast Analysis of Visible Spectral
Signatures Utilizing Asynchronous
Optical Sampling.
AD-A198 316

***DYNAMIC LOADS**

Constitutive Modelling of Joints
under Cyclic Loading. Part 1.
Modelling and Testing of Idealized
Rock Joints.*
AD-A200 232

Motion and Stability of
Saturated Soil Systems Under
Dynamic Loading.*
AD-A200 283

***DYNAMICS**

Reprint: (2+1) REMPI (Resonant-
Enhanced Multiphoton Ionization) of
 NO via D 2 Sigma(+) State:
Rotational Branching Ratios.
AD-A198 134

Reprint: Observation of
Molecular Rotors on Surfaces by
ESDIAD (Electron Stimulated
Desorption Ion Angular
Distribution): Studies of PF3 and
 NH_3 Chemisorption on Ni Surfaces.
AD-A198 505

***ELECTRIC CHARGE**

Studying Quantum Phase-Based
Electronic Devices.*
AD-A200 375

***ELECTRIC FIELDS**

Reprint: Far Field Patterns and
the Inverse Scattering Problem for
Electromagnetic Waves in an
Inhomogeneous Medium.
AD-A200 229

***ELECTRIC GENERATORS**

High Pulsed Power, Self Excited

Magnetohydrodynamic Power
Generation Systems.*
AD-A200 258

***ELECTRICAL CONDUCTIVITY**

Reprint: A New Mechanism for
Superconductivity.
AD-A198 404
PBT, PBO-Based Hybrid Polymers
with Nonlinear Optical Properties
or High Electrical Conductivity.*
AD-A200 228
Development of Conducting
Polymers of High Structural
Strength.*
AD-A200 310

***ELECTROCHEMISTRY**

Reprint: Electrochemistry at Well-
Characterized Surfaces.
AD-A197 453
Reprint: DIET in the Second
Layer: An ESDIAD (Electron
Stimulated Desorption Ion Angular
Distribution) Study of NH_3 on a CO
Layer on $Ni(111)$ and $Ni(110)$.
AD-A197 870
Reprint: Simultaneous EPR
(Electron Paramagnetic Resonance)
Electrochemical Measurements on
Polyfluorene in Ambient Temperature
Ionic Liquids.
AD-A198 137

Reprint: Formation and
Electrochemistry of Polyfluorene in
Ambient Temperature Ionic Liquids.
AD-A198 363

Reprint: Electrochemical and
Spectroscopic Studies of 1,4-
Benzoquinone in Ambient Temperature
Chloroaluminate Ionic Liquids.
AD-A198 559

Reprint: Electrochemistry of
Molybdenum Chloride Dimers in a
Basic Ambient-Temperature Molten
Salt.
AD-A198 562

Reprint: Electrochemistry of
Polythiophene and Polythiophene
Films in Ambient Temperature Molten
Salts.

SUBJECT INDEX-11
UNCLASSIFIED EVJ00F

DIS-ELE

UNCLASSIFIED

AD-A198 565

*ELECTROMAGNETIC RADIATION

Computer Simulation of
Radiation Generation from
Relativistic Electron Beams.*
AD-A199 627

Reprint: Far Field Patterns and
the Inverse Scattering Problem for
Electromagnetic Waves in an
Inhomogeneous Medium.
AD-A200 223

*ELECTROMAGNETIC SCATTERING

Reprint: Minimizing the
Reflection of Waves by Surface
Impedance Using Boundary Elements
and Global Optimization.
AD-A200 337

Optical Beam Phase-Conjugation
and Electromagnetic Scattering
Process with Intense Fields.*
AD-A200 372

*ELECTROMAGNETIC WAVE REFLECTIONS

Reprint: Minimizing the
Reflection of Waves by Surface
Impedance Using Boundary Elements
and Global Optimization.
AD-A200 337

*ELECTROMECHANICAL WAVES

Electromechanical Feedback
Processes in the Ionosphere.*
AD-A199 235

*ELECTRON ENERGY

Reprint: Electron Stimulated
Desorption from CO Chemisorbed on
Pt(111): A Dynamical Study of
Positive Ion and Metastable CO
emission.
AD-A199 729

*ELECTRON IMPACT SPECTRA

Reprint: Electron Stimulated
Desorption from CO Chemisorbed on
Pt(111): A Dynamical Study of
Positive Ion and Metastable CO
emission.
AD-A199 729

*ELECTRON IRRADIATION

Electronic Interactions of
Electrons, Photons, and Atoms with
Material Surfaces.*
AD-A199 628

*ELECTRON PARAMAGNETIC RESONANCE

Reprint: Simultaneous EPR
(electron Paramagnetic Resonance)
Electrochemical Measurements on
Polyfluorene in Ambient Temperature
Ionic Liquids.
AD-A198 157

Reprint: Simultaneous EPR

(electron Paramagnetic Resonance)
Electrochemical Measurements on
Polypyrrole in Ambient Temperature
Ionic Liquids.
AD-A198 323

*ELECTRON SPECTROSCOPY

Reprint: Femtosecond Real-Time
Dynamics of Photofragment-Trapping
Resonances on Dissociative
Potential Energy Surfaces.
AD-A198 020

Reprint: Use of Electron Spin

Resonance Spectroscopy to Study the
Photochemistry of Adsorbed Dibenzyli
Ketone on Porous Silica.
AD-A198 220

Reprint: (1+1) Resonant Enhanced
Multiphoton Ionization via the A 2
Sigma + State of NO: Ionic
Rotational Branching Ratios and
Their Intensity Dependence.
AD-A198 453

*ELECTRON SPIN RESONANCE

Reprint: Use of Electron Spin
Resonance Spectroscopy to Study the
Photochemistry of Adsorbed Dibenzyli
Ketone on Porous Silica.
AD-A198 220

Reprint: A Nomenclature for
Lambda-Doublet Levels in Rotating
Linear Molecules.
AD-A199 859

*ELECTRON TRANSFER

Investigation of a New Concept

in Semiconductor Microwave
Oscillators.*
AD-A198 039

Reprint: A New Mechanism for
Superconductivity.
AD-A198 404

*ELECTRON TRANSITIONS

Reprint: Electronic States of
the Xe(n)HCl Systems in Gas and
Condensed Phases.
AD-A199 792

*ELECTRONIC EQUIPMENT

Superconducting Electronic Film
Structures.*
AD-A200 534

*ELECTRONICS

Hybrid (Optical/Electronic)

Computing and Digital Computing.*

AD-A197 722

Reprint: Material Constraints on
Electronic Applications of Oxide
Superconductors.
AD-A200 538

*ELECTRONS

The Physics of Spin Polarized
Atomic Vapors.*
AD-A198 990

*ELECTROOPTICS

Spatial Light Modulators and
Applications. 1988 Technical Digest
Series, Volume 8.*
AD-A199 279

*ELECTROPHYSIOLOGY

Reprint: Electrophysiological
Actions of Nonrepinephrine in Rat
Lateral Hypothalamus. 2. An In
Vitro Study of the Effects of
Ionophoretically Applied
Norepinephrine on LH Neuronal
Responses to Gamma-Aminobutyric
Acid (GABA).
AD-A197 714
Changes in Somatosensory
Responsiveness in Behaving
Primates.*

SUBJECT INDEX-12
UNCLASSIFIED EVJ00F

ELE-ELE

AD-A198 792

***EMISSION SPECTRA**

- Computer Simulations of Radiation Generation from Relativistic Electron Beams.*
- AD-A198 827
- Reprint: Electronic Assignments of the Violet Bands of Sodium.
- AD-A198 839

***ENERGY**

- Reprint: Urban Climate Effects of Energy Demand for Space Heating.
- AD-A200 333

***ENERGY TRANSFER**

- Reprint: Modifying Excitation Transfer Cross Sections with an ad Stark Effect.
- AD-A197 998
- Reprint: State-Selective Studies of T Yields R, V Energy Transfer: The H + CO System.
- AD-A198 373
- Reprint: Collisional Energy Pooling for $\text{Sr}(5\text{ }^3\text{P}) + \text{Sr}(5\text{ }^3\text{P}')$ Yields $\text{Sr}(6\text{ }^3\text{, }^1\text{S}) + \text{Sr}(5\text{ }^1\text{S})$.
- AD-A200 225
- State-Specific Energy Transfer in Diatomic Radicals.*
- AD-A200 357

***ENTROPY**

- Reprint: Tail Behaviour for the Suprema of Gaussian Processes with Applications to Empirical Processes.
- AD-A200 511

***ENZYMES**

- Early Phase Interactions of Toluene with Membranes: A Structural and Functional Evaluation.*
- AD-A200 549

***EPITAXIAL GROWTH**

- Compound Semiconductor Materials, Devices and Circuits.*
- AD-A197 640

- MBE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.*
- AD-A197 752

- Use of D2 to Elucidate OMVPE (Organometallic Vapor Phase Epitaxial) Growth Mechanisms.*
- AD-A198 841

- Superconducting Electronic Film Structures.*
- AD-A200 534

***ESTIMATES**

- Reprint: Estimating Random Integrals from Noisy Observations: Sampling Designs and Their Performance.
- AD-A197 771

- A Note on Extended Quasi-Likelihood.*
- AD-A198 642

- Variance Function Estimation in Regression: The Effect of Estimating the Mean.*
- AD-A198 228

- Nonparametric Estimation of Optimal Performance Criteria in Quality Engineering.*
- AD-A198 345

- Reprint: Robust, Reduced-Order, Nonstrictly Proper State Estimation via the Optimal Projection Equations with Guaranteed Costs Bounds.
- AD-A198 367

- Reprint: Variance Function Estimation.
- AD-A198 822

***ETHERS**

- New Experimental Challenges in Elemental Fluorine Chemistry; an Emerging Technology.*
- AD-A198 371

***ETHYLENE**

- Reprint: Basis Set Effects and the Choice of Reference Geometry in Ab Initio Calculations of

- Vibrational Spectra.
- AD-A198 238

- Validation and Application of Pharmacokinetic Models for Interspecies Extrapolations in Toxicity Risk Assessments of Volatile Organics.*
- AD-A200 034

***EUTECTIC COMPOSITES**

- Transport and Junction Physics of Semiconductor-Metal Eutectic Composites.*
- AD-A198 480

***EXCIMER**

- Transient Behaviors in Chemical Reactions: Nanosecond Infrared Spectroscopy, Chemically Pumped Visible and Near-IR Lasers.*
- AD-A198 484

- The Kinetics and Dynamics of Iodine Monofluoride Formation in Gas-Phase Collisions.*
- AD-A198 522

***EXPLOSION EFFECTS**

- Geotechnical Centrifuge Modeling of Explosion Induced Craters - A check for Scaling Effects.*
- AD-A200 290

***EXPONENTIAL FUNCTIONS**

- Reprint: A Confidence Interval for Treatment Component-of-Variance with Applications to Differences in Means of Two Exponential Distributions.
- AD-A200 540

***EXTINCTION**

- Reprint: Asymptotic Structure and Extinction of Diffusion Flames with Chain Mechanism.
- AD-A200 332

***EYE MOVEMENTS**

- Visual Sensitivities and Discriminations and Their Roles in Aviation.*
- AD-A198 470

SUBJECT INDEX-13

UNCLASSIFIED

EVJ00F

EMI-EYE

UNCLASSIFIED

Eye Movements and Visual Information Processing.*
AD-A200 006

*FABRICATION
Optical Fiber Science and Technology: Novel Fibers and Fiber Sensors.*
AD-A200 311

*FABRY PEROT INTERFEROMETERS
Reprint: A Focal Coupled Etalons.
DEM: A High Resolution Double-Etalon Modulator Spectrometer.
AD-A198 298

*FACTOR ANALYSIS
Ordering Methods for Sparse Matrices and Vector Computers.*
AD-A198 291

*FACTORIAL DESIGN
Efficient Nearly Orthogonal Deletion Designs.*
AD-A197 923

*FAR FIELD
Reprint: Far Field Patterns and the Inverse Scattering Problem for Electromagnetic Waves in an Inhomogeneous Medium.
AD-A200 223

*FATIGUE(MECHANICS)
Integration of Statistical and Physical Models of Short Fatigue Crack Growth.*
AD-A197 917
Advanced Modeling for Fatigue Growth of Small Surface Cracks.*
AD-A198 077

*FATTY ACIDS
Reprint: Mechanism of Chain Extension Step in Biosynthesis.
AD-A198 138

*FAULT TOLERANT COMPUTING
Fault Tolerant Parallel Implementations of Iterative Algorithms for Optimal Control

Problems.*
AD-A198 041
Approximate Evaluation of Reliability and Availability Via Perturbation Analysis.*
AD-A199 840

*FEEDBACK
Reprint: Affine-Feedback Stabilization of Piecewise-Linear Hypersurface Systems.
AD-A198 317
Reprint: Remarks on Smooth Feedback Stabilization of Nonlinear Systems.
AD-A198 365
Reprint: A Model Reference Adaptive Control Scheme for Pure-Feedback Nonlinear System.
AD-A198 388
Reprint: The Optimal Projection Equations with Petersen-Holiot Bounds: Robust Stability and Performance via Fixed-Order Dynamic Compensation for Systems with Structured Real-Valued Parameter Uncertainty.
AD-A198 398

*FIBER OPTICS
Electromagnetic Cross Sections of Conductive Fibers: Modified Drude Equations and Dependence of Dielectric Constant on Particle Size.*
AD-A199 873
Optical Fiber Science and Fiber Technology: Novel Fibers and Fiber Sensors.*
AD-A200 311

*FIBER REINFORCEMENT
Constitutive Behavior of Fiber Reinforced Sands.*
AD-A200 524

*FIELD EFFECT TRANSISTORS
Compound Semiconductor Materials, Devices and Circuits.*
AD-A197 640

*FILMS
Detectors of Infrared Radiation Based on High T(c) Superconducting YBCO Films.*
AD-A199 820
Reprint: Material Constraints on Electronic Applications of Oxide Superconductors.
AD-A200 538

*FINITE DIFFERENCE THEORY
Coupling Linearized Far-Field Boundary Conditions with Nonlinear Near-Field Solutions in Transonic Flow.*
AD-A198 721

*FINITE ELEMENT ANALYSIS
Parallel Algorithms in the Finite Element Approximation of Flow Problems.*
AD-A197 454

*FIRE PREVENTION
Investigation of Fuel Additive Effects on Sooting Flames.*
AD-A200 273

*FIRE SAFETY
Reprint: Extinction of Interacting Premixed Flames: Theory and Experimental Comparisons.
AD-A198 279

*FLAME PROPAGATION
Reprint: Theory of Nonadiabatic Flame Propagation in Dissociation Equilibrium.
AD-A193 019
Reprint: The Evolution of Surfaces in Turbulence.
AD-A193 386

*FLAMES
Reprint: The Evolution of Surfaces in Turbulence.
AD-A198 386
Reprint: Propagation and Extinction of Stretched Premixed Flames.
AD-A193 450

SUBJECT INDEX-14
UNCLASSIFIED EVJ00F

FAB-FLA

Reprint: Structure and
Propagation of Turbulent Premixed
Flames Stabilized in a Stagnation
Flow.
AD-A198 452
Aerodynamic and Kinetic
Processes in Flames.*
AD-A198 474
Investigation of Fuel Additive
Effects on Sooting Flames.*
AD-A200 273
Reprint: Asymptotic Structure
and Extinction of Diffusion Flames
with Chain Mechanism.
AD-A200 332

*FLAMMABILITY
Radiative Augmented Combustion.*
AD-A197 300
Reprint: Propagation and
Extinction of Stretched Premixed
Flames.
AD-A198 450

*FLEXIBLE STRUCTURES
Algorithms for Robust
Identification and Control of Large
Space Structures. Phase 1.*
AD-A198 130

*FLOW Management and Control of
Separation by Unsteady and Vortical
Flows.*
AD-A198 902

*FLOW SEPARATION
Unsteady Separated Flows:
Structures and Processes.*
AD-A200 222

*FLOW VISUALIZATION
Development and Application of
Oxygen Flow Tagging for Velocity
Measurements and Flow Visualization
in Turbulent Three-Dimensional
Supersonic Flows.*
AD-A200 119

*FLUID DYNAMICS
The Measurement and Prediction

of Rotodynamic Forces for
Labyrinth Seals.*
AD-A197 185
Spray Formation: Three-
Dimensional Liquid Break-Up due to
Surface Tension.*
AD-A200 247

*FLUORESCENCE
Reprint: Two-Photon-Excited
Fluorescence Spectroscopy of Atomic
Fluorine at 170 nm.
AD-A199 240

*FLUORIDES
Transient Behaviors in Chemical
Reactions: Nanosecond Infrared
Spectroscopy, Chemically Pumped
Visible and Near-IR Lasers.*
AD-A198 484

Reprint: Observation of
Molecular Rotors on Surfaces by
ESDIAD (Electron Stimulated
Desorption Ion Angular
Distribution): Studies of PF₃ and
NH₃ Chemisorption on Ni Surfaces.
AD-A198 908
The Kinetics and Dynamics of
Iodine Monofluoride Formation in
Gas-Phase Collisions.*
AD-A199 622

*FLUORINATION
New Experimental Challenges in
Elemental Fluorine Chemistry: an
Emerging Technology.*
AD-A198 371

*FLUORINE
Reprint: Two-Photon-Excited
Fluorescence Spectroscopy of Atomic
Fluorine at 170 nm.
AD-A199 240
Two Photon Detection Techniques
for Atomic Fluorine.*
AD-A199 955

*FLUOROPOLYMERS
Ceramics Derived from Organo-
Metallic Polymers.*
AD-A200 115

*FORMALDEHYDE
Reprint: High Resolution
Spectroscopic Studies of Small
Molecules.
AD-A199 837

*FRAGMENTATION
Reprint: Fragmentation of
Molecular Adsorbates by Electron
and Ion Bombardment: Methoxy
Chemistry on Al(111).
AD-A199 728

*FREE ELECTRON LASERS
Investigation of Acceleration
and Densification of Electrons
Utilizing Travelling Magnetic
Waves.*
AD-A197 700
Computer Simulations of
Radiation Generation from
Relativistic Electron Beams.*
AD-A198 827

*FUEL ADDITIVES
Investigation of Fuel Additive
Effects on Sooting Flames.*
AD-A200 273

*FUEL SPRAYS
Spray Formation: Three-
Dimensional Liquid Break-Up due to
Surface Tension.*
AD-A200 247

*FUELS
High Pulsed Power, Self Excited
Magnetohydrodynamic Power
Generation Systems.*
AD-A200 256
Fundamental Studies of Carbon,
NH₃, and Oxygen Rings and Other High
Energy Density Molecular Systems.*
AD-A200 331

*FUNCTIONAL ANALYSIS
Remarks on the Positivity of
Densities of Stable Probability
Measure on R(d).*

AD-A197 820

UNCLASSIFIED EVJ00F

SUBJECT INDEX-15

FLA-FUN

UNCLASSIFIED

*FURANS
Reprint: Novel
(Diisopropylamino)triphosphine)hexa-
carbonyliron Complexes.
AD-A197 997

*FUSED SALTS
Reprint: Aspects of the
Chemistry of Water in Ambient-
Temperature Chloraluminate Ionic
Liquids: 170 NMR Studies.
AD-A198 225

*GALLIUM
Reprint: Description of a Two-
State System: Laser Probing of
Gallium Atom Spin-Orbit States from
Silicon (100).
AD-A199 239

*GALLIUM ARSENIDES
Compound Semiconductor
Materials, Devices and Circuits.*
AD-A197 640

MBE Growth, Characterization and
Electronic Device Processing of
HgCdTe, HgZnTe, Related
Heterojunctions and HgCdTe-CdTe
Superlattices.*
AD-A197 752

Integrated Acoustooptic Device
Modules for Optical Information
Processing.*
AD-A198 061

Defect Reduction in Epitaxial
Growth Using Superlattice Buffer
Layers.*
AD-A198 409

MBE Growth, Characterization and
Electronic Device Processing of
HgCdTe, HgZnTe, Related
Heterojunctions and HgCdTe-CdTe
Superlattices.*
AD-A198 421

Investigation of Defect and
Electronic Interactions Associated
with GaAs Device Processing.*
AD-A200 541

Single Crystal GaAs
Stoichiometry Measurements Through
Double Crystal Diffractometry.*

AD-B126 553L

*GALLIUM COMPOUNDS
Use of D2 to Elucidate OMVPE
(organometallic Vapor Phase
Epitaxial) Growth Mechanisms.*
AD-A199 841

*GALLIUM PHOSPHIDES
Compound Semiconductor
Materials, Devices and Circuits.*
AD-A197 640

*GAMMA RAYS
Shuttle Flight Test of an
Advanced Gamma-Ray Detection
System.*
AD-A198 399

*GAS DYNAMICS
Investigations of the Motion of
Discrete-Velocity Gases by Cellular
Automata.*
AD-A200 221

*GAS SURFACE INTERACTIONS
Theoretical Studies of Kinetic
Mechanisms of Negative Ion
Formation in Plasmas.*
AD-A199 994

*GELS
Ultrastructure Processing and
Environmental Stability of Advanced
Structural and Electronic
Materials.*
AD-A199 505

*GEOLOGY
Deformation Behavior of Sands
under Cyclic Loading - A Micro-
Structural Approach.*
AD-A199 555

*GERMANATES
Shuttle Flight Test of an
Advanced Gamma-Ray Detection
System.*
AD-A198 399

*GERMANIUM

Shuttle Flight Test of an
Advanced Gamma-Ray Detection
System.*
AD-A198 399

*GERMANIUM COMPOUNDS
Reprint: Anionic Ring-Opening
Polymerization of Sila- and
Germanocyclopent-3-enes.
AD-A197 874

*GLASS
Ceramics Derived from Organo-
Metallic Polymers.*
AD-A200 118

*GRAIN STRUCTURES(METALLURGY)
Research on the Statistics of
Grain Lattice Echoes and Their Use
in Grain Size Estimation and Grain
Echo Suppression.*
AD-A199 811

*GRAPHS
A 3-D Object Recognition System
Using Aspect Graphs.*
AD-A198 472

*GRAVITY WAVES
Studies of Internal Wave/Mean
Flow Interactions.*
AD-A199 949

*GROUP III COMPOUNDS
Semiconductor Alloy Engineering
for High-Speed Devices.*
AD-A200 356

Investigation of Defect and
Electronic Interactions Associated
with GaAs Device Processing.*
AD-A200 541

*GROUP V COMPOUNDS
Semiconductor Alloy Engineering
for High-Speed Devices.*
AD-A200 356

Investigation of Defect and
Electronic Interactions Associated
with GaAs Device Processing.*
AD-A200 541

SUBJECT INDEX-18
UNCLASSIFIED EVJ00F

FUR-GRO

*HALIDES

Reprint: Photochemistry of Organometallic Halide Complexes. Mechanisms for the Formation of Ionic Products.
AD-A198 488

*HARMONICS

Reprint: The Inverse Scattering Problem for Time-Harmonic Acoustic Waves in an Inhomogeneous Medium.
AD-A200 335

*HEARING

Complex Auditory Signals.*
AD-A198 832

*HEAT LOSS

Reprint: Theory of Nonadiabatic Flame Propagation in Dissociation Equilibrium.
AD-A198 018

*HELICOPTERS

Nonlinear Dynamic Responses of Composite Rotor Blades.*
AD-A200 145

*HETEROJUNCTIONS

Investigations of the Optical and Electronic Properties of Crystalline Organic Materials.*
AD-A200 074

*HEURISTIC METHODS

Parallel Algorithms for PDE solvers.*
AD-A199 625

*HILBERT SPACE

On Functional Estimates for Ill-Posed Linear Problems.*
AD-A198 004
Reprint: Stochastic Evolution Equations Driven by Nuclear-Space-Valued Martingales.
AD-A200 338

*HIPPOCAMPUS

Amine Neurotransmitter Regulation of Long-Term Synaptic

Plasticity in Hippocampus.*

AD-A200 201

*HYBRID COMPUTERS

Hybrid (Optical/Electronic) Computing and Digital Computing.*
AD-A197 722

*HYBRID SYSTEMS

PBT, PBO-Based Hybrid Polymers with Nonlinear Optical Properties or High Electrical Conductivity.*
AD-A200 228

*HYDRAZINES

The Effects of Hydrazines on Neuronal Excitability.*
AD-A200 189

*HYDRAZOTIC ACID

Reprint: Energetics and Spin-Lambda-Doublet Selectivity in the Infrared Multiphoton Dissociation HN3(X 1A) Yields N2(X 1 Sigma sub g(+)) + NH(X 3 Sigma(-), A 1 Delta): Theory.
AD-A199 528

*HYDRIDES

Reprint: Computational Studies of SiH2+SiH2 Recombination Reaction Dynamics on a Global Potential Surface Fitted to Ab Initio and Experimental Data.
AD-A198 377

Reprint: Observation of Molecular Rotors on Surfaces by ESDIAD (Electron Stimulated Desorption Ion Angular Distribution): Studies of PF3 and NH3 Chemisorption on Ni Surfaces.
AD-A198 505

Use of D2 to Elucidate OMVPE (organometallic Vapor Phase Epitaxial) Growth Mechanisms.*
AD-A199 841

*HYDROCARBONS

Reprint: Synthesis and Chemistry of Novel Polynitropolycyclic Cage Molecules.

AD-A197 858

New Experimental Challenges in Elemental Fluorine Chemistry; an Emerging Technology.*

AD-A198 371

Reprint: Laser Fluorescence Excitation Spectrum of Jet-Cooled Tropolone; The A(1) B sub 2 - X(1) A sub 1 System.

AD-A188 730

Reprint: Digital Imaging of Laser-Ignited Combustion.
AD-A200 328

*HYDROGEN

Reprint: Dynamics of Chemisorption/Scattering of Atomic Hydrogen on Partially Covered Si(111) Surfaces.

AD-A188 287

Reprint: Diffusion of H Atoms on a Si(111) Surface with Partial Hydrogen Coverage: Monte Carlo Variational Phase-Space Theory with Tunneling Correction.

AD-A198 328

Reprint: State-Selective Studies of T Yields R, V Energy Transfer: The H + CO System.

AD-A188 373

Ionization Rates Relevant to Laser Cooling of Hydrogen.*

AD-A188 481

Theoretical Studies of Kinetic Mechanisms of Negative Ion Formation in Plasmas.*

AD-A188 994

Merged Beam Studies of the Dissociative Recombination of H3(+) and H2(+).*

AD-A200 528

*HYDROGEN CHLORIDE

Reprint: Electronic States of the Xe(n)HCl Systems in Gas and Condensed Phases.

AD-A188 752

*HYDROPHOBIC PROPERTIES

Interaction of Hydrophobic Molecules with Heme Proteins.*

SUBJECT INDEX-17

UNCLASSIFIED

EVJ00F

HAL-HYD

UNCLASSIFIED

AD-A198 747

*HYDROXYL RADICALS

Reprint: Novel
(Diisopropylamino)triphosphine)hexa
carbonyldiiron Complexes.

AD-A197 987

State-Specific Energy Transfer
in Diatomic Radicals.*

AD-A200 357

*HYPNOTICS AND SEDATIVES

Pharmacological Resetting of the
Circadian Sleep-Wake Cycle.*

AD-A200 248

*IGNITION

Reprint: Digital Imaging of
Laser-Ignited Combustion.

AD-A200 328

Laser Thermal Propulsion.*

AD-A200 558

*IMAGE PROCESSING

Instrumentation Request for
Optical Symbolic Computing.*

AD-A197 561

Hybrid (Optical/Electronic)
Computing and Digital Computing.*

AD-A197 722

Studies of Optical Wave Front
Conjugation and Imaging Properties
of Nematic Liquid Crystal Films.*

AD-A197 916

Research Instrumentation for
Computer Vision, Image

Understanding and Optical
Computing.*

AD-A198 578

Role of Retinocortical
Processing in Spatial Vision.*

AD-A200 198

*IMINES

Reprint: Transannular
Cyclizations in the

Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,
9))undecane-8,11-Dione System: A

reinvestigation.

AD-A198 026

*IMPEDANCE

Reprint: Minimizing the
Reflection of Waves by Surface
Impedance Using Boundary Elements
and Global Optimization.

AD-A200 337

*INCOMPRESSIBLE FLOW

Parallel Algorithms in the
Finite Element Approximation of
Flow Problems.*

AD-A197 454

*INDIUM COMPOUNDS

Use of D2 to Elucidate OMVPE
(organometallic Vapor Phase
Epitaxial) Growth Mechanisms.*

AD-A199 841

*INDIUM PHOSPHIDES

Compound Semiconductor
Materials, Devices and Circuits.*

AD-A197 840

Defect Reduction in Epitaxial
Growth Using Superlattice Buffer
Layers.*

AD-A198 408

*INEQUALITIES

On a Correlation Inequality and
Its Applications.*

AD-A198 295

Reprint: Inequalities for the
Trace of Matrix Exponentials.

AD-A198 374

Harmonizability, V-Boundedness,
(2P)-Boundedness of Stochastic
Processes.*

AD-A200 077

Reprint: On Continuation for
Variational Inequalities.

AD-A200 212

Reprint: Diagonal Convexity
Conditions for Problems in Convex
Analysis and Quasi-Variational
Inequalities.

AD-A200 547

*INFORMATION PROCESSING

Preattentive and Attentive
Visual Information Processing.*

AD-A197 670

Information Processing of
Complex Sounds in the Anteroventral
Cochlear Nucleus.*

AD-A198 576

*INFRARED DETECTORS

Detectors of Infrared Radiation
Based on High T(c) Superconducting
YBCO Films.*

AD-A199 820

*INFRARED IMAGES

Non Contacting Evaluation of
Strains and Cracking Using Optical
and Infrared Imaging Techniques.*

AD-A200 387

*INFRARED SCANNING

Non Contacting Evaluation of
Strains and Cracking Using Optical
and Infrared Imaging Techniques.*

AD-A200 397

*INFRARED SPECTRA

Transient Behaviors in Chemical
Reactions: Nanosecond Infrared
Spectroscopy, Chemically Pumped
Visible and Near-IR Lasers.*

AD-A198 484

*INFRARED SPECTROSCOPY

Transient Behaviors in Chemical
Reactions: Nanosecond Infrared
Spectroscopy, Chemically Pumped
Visible and Near-IR Lasers.*

AD-A198 484

*INSTRUMENTATION

Non Contacting Evaluation of
Strains and Cracking Using Optical
and Infrared Imaging Techniques.*

AD-A200 397

*INTEGRALS

Reprint: Estimating Random
Integrals from Noisy Observations:
Sampling Designs and Their
Performance.

AD-A197 771

SUBJECT INDEX-18
UNCLASSIFIED EVJ00F

HYD-INT

***INTERFACES**

Reprint: Material Constraints on Electronic Applications of Oxide Superconductors.
AD-A200 538

***INTERFEROMETRY**

Opening Switch Research on a Plasma Focus VI.*
AD-A198 155

***INTERNAL WAVES**

Studies of Internal Wave/Shear Flow Interactions.*
AD-A199 848

***INTERVALS**

Reprint: A Confidence Interval for Treatment Component-of-Variance with Applications to Differences in Means of Two Exponential Distributions.
AD-A200 540

***INVERSE SCATTERING**

Reprint: Far Field Patterns and the Inverse Scattering Problem for Electromagnetic Waves in an Inhomogeneous Medium.
AD-A200 223

***IODIDES**

Reprint: Time Dependent Absorption of Fragments During Dissociation.
AD-A198 329
Reprint: Vector Correlations in the Photodissociation of CH_3I , OCS , and Glyoxal.
AD-A198 332

***IODINE**

Reprint: Absorption of Gaseous Iodine by Polythiophene Films and Powders.
AD-A198 218
Reprint: Holes, Electrons, Polarons, and Bipolarons and the Thermodynamics of Electrically Active Dopants in Conducting Polymers.

AD-A198 402

***IODINE COMPOUNDS**

The Kinetics and Dynamics of Iodine Monofluoride Formation in Gas-Phase Collisions.*
AD-A199 822

***ION BEAMS**

Mega-Amp Opening Switch with Nested Electrodes/Pulsed Generator of Ion and Ion Cluster Beams.*
AD-A198 485

***ION BOMBARDMENT**

Electronic Interactions of Electrons, Photons, and Atoms with Material Surfaces.*
AD-A198 628
Reprint: Fragmentation of Molecular Adsorbates by Electron and Ion Bombardment: Methoxy Chemistry on $\text{Al}(111)$.
AD-A199 728

***ION ION INTERACTIONS**

Theoretical Studies of Kinetic Mechanisms of Negative Ion Formation in Plasmas.*
AD-A199 994

***ION SOURCES**

Merged Beam Studies of the Dissociative Recombination of $\text{H}_3(+)$ and $\text{H}_2(+)$.*
AD-A200 526

***IONIZATION**

Reprint: $(2+1)$ REMPI (Resonance-Enhanced Multiphoton Ionization) of NO via $2\ 2\ \Sigma^+(\pi)$ State: Rotational Branching Ratios.
AD-A198 134
Reprint: Remeasurement of the Rate Constant and Branching Ratio for the $\text{N}(2)+\text{O}$ Reaction.
AD-A198 385
Reprint: Effects of Autolionizing Resonances on Electron-Impact Excitation Rates for Be-Like Ions.
AD-A198 407

Reprint: Competition among Collisional Deactivation, Ionization, and Dissociation in the Multiphoton Excitation of Octafluorocyclooctatetraene.
AD-A200 508

***IONOSPHERIC MODELS**

Electromechanical Feedback Processes in the Ionosphere.*
AD-A199 235

***IONS**

Reprint: Dynamics of Interaction between a 1,9-Biradical and Lanthanide Ions.
AD-A198 088
Reprint: Photochemistry of Organometallic Halide Complexes. Mechanisms for the Formation of Ionic Products.
AD-A198 488
The University of New Hampshire Vacuum Chamber and Charged Particle Calibration Source.*
AD-A199 623

***IRON COMPOUNDS**

Photochemical Disproportionation Reactions of the $\text{W}(\text{CO})_{10}(2-)$ and $\text{Fe}(\text{CO})_8(2-)$ Complexes.*
AD-A197 900
Reprint: Structure of a Bis(eta4-exocyclic-1,3-diene) $\text{Fe}(\text{CO})_3$ Complex.
AD-A198 319

***IRRADIATION**

Reprint: UHV Transport System for Laser Irradiation Studies.
AD-A200 330

***ISOTHERMS**

Reprint: Absorption of Gaseous Iodine by Polythiophene Films and Powders.
AD-A198 218

***ISOTOPE EFFECT**

Reprint: Mechanism of the 1,5-Sigmatropic Hydrogen Shift in 1,3-

SUBJECT INDEX-19
UNCLASSIFIED EVJ00F

INT-ISO

UNCLASSIFIED

Pentadiene.

AD-A200 194

*ITERATIONS

Optimum acceleration factors for iterative solutions of linear and non-linear systems.*

AD-A198 408

*JET ENGINES

Cyclic Deformation, Damage, and Effects of Environment in the N13A1 Ordered Alloy at Elevated Temperatures.*

AD-A198 500

*JET FLAMES

Carbon Monoxide and Turbulence-Chemistry Interactions: Blowoff and Extinction of Turbulent Jet Diffusion Flames.*

AD-A199 961

*JOINTS

Constitutive Modelling of Joints under Cyclic Loading. Part 1. Modelling and Testing of Idealized Rock Joints.*

AD-A200 232

Constitutive Modelling of Joints under Cyclic Loading. Part 3. Cyclic Multi Degree-of-Freedom Shear Device with Pore Water Pressure.*

AD-A200 234

*JOSEPHSON JUNCTIONS

Millimeter Wave Generation Using Josephson Junction Arrays.*

AD-A200 259

*JUNCTIONS

Semiconductor Alloy Engineering for High-Speed Devices.*

AD-A200 356

Superconducting Electronic Film Structures.*

AD-A200 534

Reprint: Material Constraints on Electronic Applications of Oxide Superconductors.

AD-A200 536

*KETONES

Reprint: A Dimer Ketone Formed via Fe(CO)5-Promoted Coupling of 7-Phenoxynorbornadiene to Carbon Monoxide.

AD-A197 884

Reprint: Transannular

Cyclizations in the Pentacyclo(5.4.0.0(2.8).0(3.10).0(5.9))undecane-8,11-Dione System: A reinvestigation.

AD-A198 026

Reprint: Use of Electron Spin Resonance Spectroscopy to Study the Photochemistry of Adsorbed Dibenzy Ketone on Porous Silica.

AD-A198 320

Reprint: Structure of a Bis(eta4-exocyclo(1,3-diene)Fe(CO)3 Complex.

AD-A198 319

Reprint:

(Dialkylamino)phosphorus Metal Carbonyls. 5. Chemical Reactivity of the Phosphorus-Bridging Carbonyl Group in Carbonylbis(diisopropylamino)phosphido)hexacarbonyliron(1-4).

AD-A198 327

*KIDNEYS

Interactions Among Drinking and Ground Water Contaminants on Renal and Hepatic Function.*

AD-A197 075

*LABORATORIES

Center for Basic Research in Radiation Bioeffects.*

AD-A198 154

*LAMINATES

Analytical and Experimental Characterization of Damage Processes in Composite Laminates.*

AD-A198 058

Cumulative Damage Modelling in Composite Laminates.*

AD-A198 282

*LANTHANUM

Reprint: Dynamics of Interaction between a 1,9-Biradical and Lanthanide Ions.

AD-A198 088

*LASER BEAMS

Laser Measurements of Transient High-Strength Electric Fields.*

AD-A198 247

Reprint: UHV Transport System for Laser Irradiation Studies.

AD-A200 330

Reprint: Line Shape of an Atomic Crystal Bond.

AD-A200 362

*LASER DAMAGE

Topical Meeting on Optics in Adverse Environments: Summaries of Papers Presented at the Optics in Adverse Environments Topical Meeting Held in Albuquerque, New Mexico on 11-12 February 1987..

AD-A197 119

*LASER INDUCED FLUORESCENCE

Surface Thermometry of Energetic Materials by Laser-Induced Fluorescence.*

AD-A198 084

Reprint: Laser Fluorescence Excitation Spectrum of Jet-Cooled Tropolone: The A(1) B sub 2 - X(1) A sub 1 System.

AD-A198 730

*LASER PUMPING

Reprint: Pump/Probe Method for Fast Analysis of Visible Spectral Signatures Utilizing Asynchronous Optical Sampling.

AD-A198 318

*LASER TARGET INTERACTIONS

Reprint: Theory of Laser-Pulse-Induced Molecular Dynamics: Gas-Phase Molecular Collisions and Abound Dynamics.

AD-A197 871

SUBJECT INDEX-20

UNCLASSIFIED EVJ00F

ITE-LAS

- *LASERS**
Structure Dynamics of Excited Atoms.*
AD-A198 147
Opening Switch Research on a Plasma Focus VI.*
AD-A198 155
Transient Behaviors in Chemical Reactions: Nanosecond Infrared Spectroscopy, Chemically Pumped Visible and Near-IR Lasers.*
AD-A198 484
The Kinetics and Dynamics of Iodine Monofluoride Formation in Gas-Phase Collisions.*
AD-A199 822
Laser Thermal Propulsion.*
AD-A200 558
- *LATTICE DYNAMICS**
Reprint: Lattice Vibrations in Thin-Film Carbon: Electron-Rayleigh-Wave Interaction.
AD-A198 289
Defect Reduction in Epitaxial Growth Using Superlattice Buffer Layers.*
AD-A198 409
- *LEAST SQUARES METHOD**
An Asymptotic Theory for Weighted Least Squares with Weights Estimated by Replication.*
AD-A198 000
Reprint: A Note on Computing Robust Regression Estimates via Iteratively Reweighted Least Squares.
AD-A200 181
- *LEVARTERENOL**
Reprint: Electrophysiological Actions of Norepinephrine in Rat Lateral Hypothalamus. 2. An In Vitro Study of the Effects of Ionophoretically Applied Norepinephrine on LH Neuronal Responses to Gamma-Aminobutyric Acid (GABA).
AD-A197 714
Reprint: Norepinephrine Enhances
- Long-Term Potentiation at Hippocampal Mossy Fiber Synapses.
AD-A197 980
Reprint: Electrophysiological Actions of Norepinephrine in Rat Lateral Hypothalamus.
Norepinephrine-Induced Modulation of LH Neuronal Responsiveness to Afferent Synaptic Inputs and Putative Neurotransmitters.
AD-A198 189
Bioreactivity: Studies on a Simple Brain Stem Reflex in Behaving Animals.*
AD-A198 404
- *LIFE EXPECTANCY(SERVICE LIFE)**
Reprint: Reliability of Complex Devices in Random Environments.
AD-A198 553
- *LIFTING SURFACES**
Studies of Unsteadiness in Boundary Layers.*
AD-A198 889
- *LIGHT MODULATORS**
Spatial Light Modulators and Applications. 1988 Technical Digest Series, Volume 8.*
AD-A198 278
- *LIGHT SCATTERING**
Reprint: Nematic Solutions of Rodlike Polymers Light Scattering from Nematic Solutions with Complex Texture and Phase Separation in Poor Solvents.
AD-A198 454
- *LIGHT SOURCES**
Intense XUV Radiation Sources.*
AD-A200 282
- *LIGHT TRANSMISSION**
Long Term Studies of the Reflective Index Structure Parameter in the Troposphere and Stratosphere.*
AD-A198 313
Optical Beam Phase-Conjugation
- and Electromagnetic Scattering Process with Intense Fields.*
AD-A200 372
- *LINE SPECTRA**
Reprint: Line Shape of an Atom-Crystal Bond.
AD-A200 362
- *LINEAR ALGEBRA**
Optimum acceleration factors for iterative solutions of linear and non-linear systems.*
AD-A198 408
- *LINEAR REGRESSION ANALYSIS**
An Asymptotic Theory for Weighted Least Squares with Weights Estimated by Replication.*
AD-A198 000
Reprint: The Effects of Variance Function Estimation on Prediction and Calibration. An Example.
AD-A199 821
- *LINEAR SYSTEMS**
Reprint: On the Immersion of a Discrete Time Nonlinear System into a Linear System.
AD-A198 316
Reprint: A Nomenclature for Lambda-Doublet Levels in Rotating Linear Molecules.
AD-A199 838
- *LINEARITY**
Reprint: On the Immersion of a Discrete Time Nonlinear System into a Linear System.
AD-A198 316
Reprint: Conditional Scores and Optimal Scores for Generalized Linear Measurement-Error Models.
AD-A198 379
- *LIQUID CRYSTAL DISPLAY SYSTEMS**
Spatial Light Modulators and Applications. 1988 Technical Digest Series, Volume 8.*
AD-A199 279

SUBJECT INDEX-21
UNCLASSIFIED EVJ00F

LAS-LIQ

UNCLASSIFIED

*LIQUID CRYSTALS

Studies of Optical Wave Front
Conjugation and Imaging Properties
of Nematic Liquid Crystal Films.*
AD-A197 918
Reprint: Frank Elastic Constants
and Leslie-Ericksen Viscosity
Coefficients of Nematic Solutions
of a Rodlike Polymer.
AD-A198 481
Novel Liquid Crystals - Polymers
and Monomers - As Nonlinear Optical
Materials.*
AD-A200 075
Reprint: Synthesis of Side Chain
Liquid Crystal Polymers for
Nonlinear Optics.
AD-A200 388

*LITHIUM

Electronic Interactions of
Electrons, Photons, and Atoms with
Material Surfaces.*
AD-A199 628
Reprint: High Resolution
Spectroscopic Studies of Small
Molecules.
AD-A199 837
Theoretical Studies of Kinetic
Mechanisms of Negative Ion
Formation in Plasmas.*
AD-A199 994

*LITHIUM FLUORIDES

Electronic Interactions of
Electrons, Photons, and Atoms with
Material Surfaces.*
AD-A199 628

*LIVER

Interactions Among Drinking and
Ground Water Contaminants on Renal
and Hepatic Function.*
AD-A197 075

*LOGISTICS

Role of Surface and Thin Film
Composition and Microstructure and
Properties of Materials.*
AD-A197 995

*LYAPUNOV FUNCTIONS

Reprint: The Optimal Projection
Equations with Petersen-Hollot
Bounds: Robust Stability and
Performance via Fixed-Order Dynamic
Compensation for Systems with
Structured Real-Valued Parameter
Uncertainty.
AD-A198 398

*MAGNETIC FIELDS

Investigation of Acceleration
and Densification of Electrons
Utilizing Travelling Magnetic
Waves.*
AD-A197 700
Experimental Study of Plasmoid
Formation and Transport by Means of
Moving Magnetic Fields.*
AD-A200 005

*MAGNETOENCEPHALOGRAMS

Perceptual Factors in Workload:
A Neuromagnetic Study.*
AD-A198 487

*MAGNETOHYDRODYNAMIC GENERATORS

High Pulsed Power, Self Excited
Magnetohydrodynamic Power
Generation Systems.*
AD-A200 258

*MAGNETOHYDRODYNAMIC WAVES

Alfven Waves in a Cold Plasma
with Curved Magnetic Fields.*
AD-A200 312

*MAGNETOSPHERE

Alfven Waves in a Cold Plasma
with Curved Magnetic Fields.*
AD-A200 312

*MARKOV PROCESSES

Reprint: Memory-Induced Extra
Resonances of Adsorbates.
AD-A198 211

*MASS SPECTROMETERS

Tunable Solid State Lasers and
Synthetic Nonlinear Materials.*
AD-A199 992

*MATERIALS

Constitutive Modelling of Joints
under Cyclic Loading. Part 2.
Further Development of Hierarchical
Plasticity Model for Joints.*
AD-A200 233
Constitutive Modelling of Joints
under Cyclic Loading. Part 4.
Development of Simulated Rock Like
Material and Testing.*
AD-A200 235

*MATHEMATICAL FILTERS

Reprint: Level Crossings of
Filtered Dichotomous Noise.
AD-A198 188

*MATHEMATICAL MODELS

Identifying Nonlinear Covariate
Effects in Semimartingale
Regression Models.*
AD-A197 323
Covariance Analysis in
Generalized Linear Measurement
Error Models.*
AD-A197 881

Algorithms for Robust

Identification and Control of Large
Space Structures. Phase 1.*
AD-A198 130

On Lifetimes Influenced by a
Common Environment.*
AD-A198 273

Reprint: Conditional Scores and
Optimal Scores for Generalized
Linear Measurement-Error Models.
AD-A198 378

Reprint: Robust, Reduced-Order,
Nonstrictly Proper State Estimation
via the Optimal Projection
Equations with Guaranteed Costs
Bounds.
AD-A198 397

Reprint: The Effects of Variance
Function Estimation on Prediction
and Calibration. An Example.
AD-A199 821

*MATRIX MATERIALS

Fundamentals of Interfacial
Strength in Composite Materials.*

SUBJECT INDEX-22
UNCLASSIFIED EVJ00F

LIQ-MAT

AD-A198 826

***MATRIX THEORY**

Reprint: Continuity of Closest Rank-p Approximations to Matrices.
AD-A200 213

***MEAN**

Variance Function Estimation in Regression: The Effect of Estimating the Mean.*
AD-A198 228

***MEASUREMENT**

Laser Measurements of Transient High-Strength Electric Fields.*
AD-A198 247

***MEASURING INSTRUMENTS**

Spectroscopic and Light Scattering Instrumentation Proposal.*
AD-A199 891

***MEMBRANES**

Regulation of Voltage-Dependent Channel Function.*
AD-A200 375

***MEMBRANES(BIOLOGY)**

Reprint: Cellular Mechanisms of Noradrenergic Enhancement of Long-Term Synaptic Potentiation in Hippocampus.
AD-A197 191

Early Phase Interactions of Toluene with Membranes: A Structural and Functional Evaluation.*
AD-A200 549

***MEMORY(PSYCHOLOGY)**

Synaptic Plasticity and Memory Function.*
AD-A198 473

***MERCURY**

Reprint: Synthesis of Trifluorosilyl Organometallic Complexes from Trifluorosilyl Radicals and Metal Atoms.

AD-A198 580

***MERCURY COMPOUNDS**

MBE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.*
AD-A197 752

MBE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.*
AD-A198 421

***MESOSPHERE**

Investigations of the Dynamics and Thermodynamics of the Mesosphere and Upper Thermosphere at the Polar Regions.*
AD-A198 463

***METAL CARBONYLS**

Reprint: Move)
(Diisopropylamino)triposphine)hexacarbonyldiiron Complexes.
AD-A197 597

***METAL**

(Diisopropylamino)phosphorus Metal Carbonyls. 5. Chemical Reactivity of the Phosphorus-Bridging Carbonyl Group in Carbonyls((diisopropylamino)phosphido)hexacarbonyldiiron(1-4).

AD-A198 327

Reprint: Dialkylamino Phosphorus Metal Carbonyls. 1. Mononuclear Derivatives from Reactions of Bis(diisopropylamino)phosphine with Metal Carbonyls.

AD-A198 563

Reprint: Dialkylaminophosphorus Metal Carbonyls. 7. Trinuclear Iron Carbonyl Derivatives from Reactions of Disodium Octacarbonyldiferrate with (Dialkylamino)dichlorophosphine S.

AD-A200 195

***METAL COMPLEXES**

Reprint: Dialkylamino Phosphorus Metal Carbonyls. 1. Mononuclear Derivatives from Reactions of Bis(diisopropylamino)phosphine with Metal Carbonyls.
AD-A198 583

***METALS**

Reprint: Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 75. Reactions of Octacarbonyldicobalt with the Salts (X)(W(triple bond CR)(CO)2(eta 5-C2B8H9Me2)) (X = MeT4 or PPh4; R = Me, Ph, C6H4Me-2, or C6H4Me-4); Crystal Structure of (PPh4)(Co2W(mu sub 3-CPh)(CO)8(eta 5-C2B8H9Me2)). 0.5CH2Cl2.
AD-A200 065

***METALLIZING**

Reprint: Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 74. Salts of the Anions (W(Triple Bond CR)(CO)2(eta 5)-C2B8H9Me2))- (R=C6H4Me-2 or C6H3Me2-2,6) as Reagents for the Synthesis of Compounds with Heteronuclear Metal-Metal Bonds: Crystal Structure of (N(Et)4)-(FeW(mu-CCB8H3Me2-2,6)(CO)5(eta 5)-C2B8H9Me2)).
AD-A200 218

***METALLIZING**

Electronic Interactions of Electrons, Photons, and Atoms with Material Surfaces.*
AD-A198 626

***METALLURGY**

Fundamentals of Interfacial Strength in Composite Materials.*
AD-A198 626

***METALS**

Reprint: AM1 Parameters for Zinc.
AD-A197 922
High Pulsed Power, Self Excited Magnetohydrodynamic Power Generation Systems.*
AD-A200 258

SUBJECT INDEX-23
UNCLASSIFIED EVJ00F

MAT-MET

UNCLASSIFIED

Reprint: UHV Transport System
for Laser Irradiation Studies.
AD-A200 330

*METEOROLOGICAL SATELLITES

Reprint: Equatorial Semiannual
Oscillation in Zonally Averaged
Temperature Observed by the Nimbus
7 SAMS (Stratospheric and
Mesospheric Sounder) and LIMS (Limb
Infrared Monitor of the
Stratosphere).
AD-A200 567

*METHANE

Aerodynamic and Kinetic
Processes in Flames.*
AD-A198 474

*METHYL RADICALS

Reprint: Vector Correlations in
the Photodissociation of CH3I, OCS,
and Glyoxal.
AD-A198 332

Reprint: Basis Set Effects and
the Choice of Reference Geometry in
Ab Initio Calculations of
Vibrational Spectra.
AD-A199 238

Reprint: Fragmentation of
Molecular Adsorbates by Electron
and Ion Bombardment: Methoxy
Chemistry on Al(111).
AD-A199 728

*MICROELECTRONICS

Fundamental Quantum 1/F Noise in
Ultrasmall Semiconductor Devices
and Their Optimal Design
Principles.*
AD-A198 462

*MICROSCOPY

Scanning Tunneling Microscopy as
a Surface Chemical Probe.*
AD-A199 922

*MICROSTRUCTURE

Microstructure and Properties of
Catalysts Symposium Held in Boston,
Massachusetts on November 30-

December 3, 1987. Materials
Research Society Symposium
Proceedings. Volume 111.*
AD-A197 253

Bonding at Metal-Ceramic
Interfaces in Hybrid Materials.*
AD-A197 928

Role of Surface and Thin Film
Composition and Microstructure and
Properties of Materials.*
AD-A197 995

Microstructure, Porosity and
Mechanical Property Relationships
of Calcium-Silicate-Hydrate.*
AD-A200 120

High Temperature Mechanical
Testing Facilities.*
AD-A200 535

*MILLIMETER WAVES

Millimeter Wave Generation Using
Josephson Junction Arrays.*
AD-A200 259

*MODE LOCKED LASERS

Reprint: Pump/Probe Method for
Fast Analysis of Visible Spectral
Signatures Utilizing Asynchronous
Optical Sampling.
AD-A198 318

*MODEL THEORY

Validation and Application of
Pharmacokinetic Models for
Interspecies Extrapolations in
Toxicity Risk Assessments of
Volatile Organics.*
AD-A200 034

*MOLECULAR BEAMS

Proceedings of the Topical
Meeting on the Microphysics of
Surfaces, Beams, and Adsorbates
(2nd) held in Santa Fe, New Mexico
on 18-19 February 1987.*
AD-A197 601

*MOLECULAR IONS

Merged Beam Studies of the
Dissociative Recombination of H3(+)
and H2(+).*

AD-A200 528

*MOLECULAR STRUCTURE

Reprint: The Electronic and
Molecular Structure of Silyl
Nitrene.
AD-A198 270

*MOLECULE MOLECULE INTERACTIONS
Interaction of Hydrophobic
Molecules with Heme Proteins.*
AD-A198 747

*MOLECULES

Reprint: Ultrafast Laser
Spectroscopy of Chemical Reactions.
AD-A198 328

*MOLYBDENUM COMPOUNDS

Reprint: Electrochemistry of
Molybdenum Chloride Dimers in a
Basic Ambient-Temperature Molten
Salt.
AD-A198 562

*MONITORING

Reprint: Equatorial Semiannual
Oscillation in Zonally Averaged
Temperature Observed by the Nimbus
7 SAMS (Stratospheric and
Mesospheric Sounder) and LIMS (Limb
Infrared Monitor of the
Stratosphere).
AD-A200 567

*MONTE CARLO METHOD

Investigations of the Motion of
Discrete-Velocity Gases by Cellular
Automata.*
AD-A200 221

*MOTOR NEURONS

The Effects of Hydrazines on
Neuronal Excitability.*
AD-A200 165

*MULTIVARIATE ANALYSIS

Reprint: Degenerate Multivariate
Stationary Processes: Basicity,
Past and Future, and Autoregressive
Representation.

SUBJECT INDEX-24
UNCLASSIFIED EVJ00F

MET-MUL

AD-A198 929

*N TYPE SEMICONDUCTORS

Shuttle Flight Test of an Advanced Gamma-Ray Detection System.*

AD-A198 399

*NAPHTHALENES

Reprint: Structural Assignment of a Methylcyclopentadiene-Toluquinone Diels-Adler Cycloadduct. Analysis of the Two-Dimensional NMR Spectrum of 1,8-Dimethyl-1 alpha, 4 alpha, 4a alpha, 5 alpha, 8 beta, 8a alpha-hexahydro-1, 4-methanonaphthalene-5, 8-diol.

AD-A197 794

*NERVE CELLS

Circuit Behavior in the Development of Neuronal Networks.*

AD-A198 040

Reprint: Electrophysiological Actions of Norepinephrine in Rat Lateral Hypothalamus. Norepinephrine-Induced Modulation of LH Neuronal Responsiveness to Afferent Synaptic Inputs and Putative Neurotransmitters.

AD-A198 189

Neurophysiological Research Supporting the Investigation of Adaptive Network Architectures.*

AD-A199 878

Modulation of Thalamic Somatosensory Neurons by Arousal and Attention.*

AD-A200 073

The Effects of Hydrazines on Neuronal Excitability.*

AD-A200 159

Regulation of Voltage-Dependent Channel Function.*

AD-A200 375

*NERVE TRANSMISSION

Reprint: Norepinephrine Enhances Long-Term Potentiation at Hippocampal Mossy Fiber Synapses.

AD-A197 990

Reprint: Electrophysiological Actions of Norepinephrine in Rat Lateral Hypothalamus. Norepinephrine-Induced Modulation of LH Neuronal Responsiveness to Afferent Synaptic Inputs and Putative Neurotransmitters.

AD-A198 189

Amine Neurotransmitter Regulation of Long-Term Synaptic Plasticity in Hippocampus.*

AD-A200 201

*NEURAL NETS

Circuit Behavior in the Development of Neuronal Networks.*

AD-A198 040

Research Instrumentation for Computer Vision, Image Understanding and Optical Computing.*

AD-A198 578

Collective Properties of Neural Systems and Their Relation to Other Physical Models.*

AD-A199 988

Symbolic Processor Based Models of Neural Networks.*

AD-A200 200

Connectionist Models for Intelligent Computation.*

AD-A200 445

*NEUROCHEMISTRY

Bioreactivity: Studies on a Simple Brain Stem Reflex in Behaving Animals.*

AD-A199 404

*NEUROMUSCULAR TRANSMISSION

Amine Neurotransmitter

Regulation of Long-Term Synaptic Plasticity in Hippocampus.*

AD-A200 201

Behavioral Consequences of Neurotransmitter Regulation.*

AD-A200 374

*NEUROPHYSIOLOGY

Circuit Behavior in the

Development of Neuronal Networks.*

AD-A198 040

The Role of Central Monoaminergic Systems in Arousal and Selective Attention.*

AD-A198 298

Conference on the Neurophysiological Foundations of Visual Perception.*

AD-A198 407

Perceptual Factors in Workload: A Neuromagnetic Study.*

AD-A198 487

Neurophysiological Research Supporting the Investigation of Adaptive Network Architectures.*

AD-A199 878

*NICKEL

Fundamental Understanding of the Intrinsic Ductility in Nickel-Base L1 sub 2 Type Alloys.*

AD-A197 805

Reprint: Observation of

Molecular Rotors on Surfaces by ESDIAD (Electron Stimulated Desorption Ion Angular Distribution): Studies of PF3 and NH3 Chemisorption on Ni Surfaces.

AD-A198 505

Scanning Tunneling Microscopy as a Surface Chemical Probe.*

AD-A199 922

*NICKEL ALLOYS

Cyclic Deformation, Damage, and Effects of Environment in the Ni3Al Ordered Alloy at Elevated Temperatures.*

AD-A198 500

*NIOBIUM

Dispersion Strengthening of High Temperature Niobium Alloys.*

AD-A199 958

*NITRO RADICALS

Reprint: Synthesis and Chemistry of Novel Polynitropolycyclic Cage Molecules.

AD-A197 656

UNCLASSIFIED

Novel Liquid Crystals - Polymers and Monomers - As Nonlinear Optical Materials.*
AD-A200 075

*NITROGEN
State-Specific Energy Transfer in Diatomic Radicals.*
AD-A200 357

*NITROGEN COMPOUNDS
Reprint: The Electronic and Molecular Structure of Silyl Nitrene.
AD-A198 270
Reprint: Observation of Molecular Rotors on Surfaces by ESDIAD (Electron Stimulated Desorption Ion Angular Distribution): Studies of PF₃ and NH₃ Chemisorption on Ni Surfaces.
AD-A198 505
Reprint: Synthesis of Side Chain Liquid Crystal Polymers for Nonlinear Optics.
AD-A200 386

*NITROGEN OXIDES
Reprint: (2+1) REMPI (Resonant-Enhanced Multiphoton Ionization) of NO via D 2 Sigma(+) State: Rotational Branching Ratios.
AD-A198 134
Reprint: Ionic Rotational Branching Ratios in Resonant Enhanced Multiphoton Ionization of NO via the A 2Sigma + (3s sigma) and D 2Sigma + (3p sigma) States.
AD-A198 330
Reprint: Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (resonantly Enhanced Multiphoton Ionization) of NO.
AD-A198 367
Reprint: (1+1) Resonant Enhanced Multiphoton Ionization via the A 2 Sigma + State of NO: Ionic Rotational Branching Ratios and Their Intensity Dependence.
AD-A198 453

NOISE(ELECTRICAL AND ELECTROMAGNETIC) Adaptive Hybrid Picture Coding.
AD-A200 059

*NONDESTRUCTIVE TESTING
Non Contacting Evaluation of Strains and Cracking Using Optical and Infrared Imaging Techniques.*
AD-A200 397

*NONLINEAR ALGEBRAIC EQUATIONS
Optimum acceleration factors for iterative solutions of linear and non-linear systems.*
AD-A198 408

*NONLINEAR ANALYSIS
Some Problems in Nonlinear Analysis.*
AD-A198 810

*NONLINEAR SYSTEMS
Reprint: Nonlinear Discrete-Time Systems: Algebraic Theory.
AD-A197 821
Reprint: Level Crossings of Filtered Dichotomous Noise.
AD-A198 188

Small Strain Response of Random Arrays of Elastic Spheres Using a Nonlinear Distinct Element Procedure.*
AD-A198 281
Reprint: On the Immersion of a Discrete Time Nonlinear System into a Linear System.
AD-A198 316
Reprint: Remarks on Smooth Feedback Stabilization of Nonlinear Systems.
AD-A198 335
Reprint: A Model Reference Adaptive Control Scheme for Pure-Feedback Nonlinear System.
AD-A198 336
Reprint: Remarks on Discretization and Linear Equivalence of Continuous Time Nonlinear Systems.
AD-A198 388
Reprint: Immersion and Immersion

by Nonsingular Feedback of a Discrete-Time Nonlinear System Into a Linear System.
AD-A198 557

Tunable Solid State Lasers and Synthetic Nonlinear Materials.*
AD-A199 992

*NONPARAMETRIC STATISTICS
Nonparametric Estimation of Optimal Performance Criteria in Quality Engineering.*
AD-A198 315

*NUCLEAR MAGNETIC RESONANCE
Purchase of a Nuclear Magnetic Resonance Spectrometer.*
AD-A197 610

Reprint: The Chemistry of Water in Ambient-Temperature Chloraluminate Ionic Liquids: NMR studies.
AD-A198 324

*NUCLEAR RADIATION SPECTROMETERS
Purchase of a Nuclear Magnetic Resonance Spectrometer.*
AD-A197 610

*NUCLEI
The Physics of Spin Polarized Atomic Vapors.*
AD-A199 990

*NUCLEI(BIOLOGY)
Information Processing of Complex Sounds in the Anteroventral Cochlear Nucleus.*
AD-A198 576

*OPTICAL EQUIPMENT
Topical Meeting on Optics in Adverse Environments: Summaries of Papers Presented at the Optics in Adverse Environments Topical Meeting held in Albuquerque, New Mexico on 11-12 February 1987. Technical Digest Series. Volume 8.*
AD-A197 119
Tunable Solid State Lasers and Synthetic Nonlinear Materials.*

SUBJECT INDEX-28
UNCLASSIFIED EVJ00F

NIT-OPT

AD-A199 992

*OPTICAL EQUIPMENT COMPONENTS

Topical Meeting on Optics in Adverse Environments: Summaries of Papers Presented at the Optics in Adverse Environments Topical Meeting Held in Albuquerque, New Mexico on 11-12 February 1987. Technical Digest Series, Volume 8. *

AD-A197 119

*OPTICAL IMAGES

Optical Acquisition, Image and Data Compression. *

AD-A199 993

*OPTICAL MATERIALS

Organic and Polymeric Nonlinear Optical Materials; a Topical Workshop Held in Virginia Beach, Virginia on May 18-19, 1988. *

AD-A198 305

Reprint: Synthesis of Side Chain Liquid Crystal Polymers for Nonlinear Optics.

AD-A200 368

Reprint: Pyridine N-Oxides as Polymeric Nonlinear Optical Materials.

AD-A200 367

*OPTICAL PROCESSING

Instrumentation Request for Optical Symbolic Computing. *

AD-A197 561

Optical Symbolic Processor for Expert System Execution. *

AD-A197 668

Hybrid (Optical/Electronic) Computing and Digital Computing. *

AD-A197 722

Research Instrumentation for

Computer Vision, Image

Understanding and Optical

Computing. *

AD-A198 578

Optical Acquisition, Image and Data Compression. *

AD-A199 993

Research in Optical Symbolic

Computing Tasks. *

AD-A199 998

*OPTICAL PROPERTIES

Reprint: Third-Order Nonlinear Optical Effects in Organic Polymeric Films.

AD-A198 384

*OPTICAL SWITCHING

Studies of Optical Wave Front Conjugation and Imaging Properties of Nematic Liquid Crystal Films. *

AD-A197 913

*OPTICS

Collective Properties of Neural Systems and Their Relation to Other Physical Models. *

AD-A199 988

*ORDER STATISTICS

Discrimination Analysis when the Variates are Grouped and Observed in Sequential Order. *

AD-A198 405

*ORGANIC COMPOUNDS

Reprint: Dialkylamino Phosphorus Metal Carbonyls. 6. Chemistry of (Tris(dilisopropylamino)triphosphine)d Iron Hexacarbonyl Derivatives Including the Synthesis and Structure of Heterometallic Derivatives 1-4.

AD-A198 561

*ORGANIC MATERIALS

Investigations of the Optical and Electronic Properties of Crystalline Organic Materials. *

AD-A200 074

*ORGANIC PHOSPHORUS COMPOUNDS

Reprint: Dialkylamino Phosphorus Metal Carbonyls. 1. Mononuclear Derivatives from Reactions of Bis(dilisopropylamino)phosphine with Metal Carbonyls.

AD-A198 563

Reprint: Dialkylamino Phosphorus

Metal Carbonyls. 4. Novel Phosphorus-Bridging Carbonyl Derivatives and Triphosphine Derivatives from Reactions of Tetracarbonylferrate(-II) with (Dialkylamino)dichlorophosphines 1-4.

AD-A198 564

Reprint: Dialkylaminophosphorus Metal Carbonyls. 7. Trinuclear Iron Carbonyl Derivatives from Reactions of Disodium Octacarbonyldiferrate with (Dialkylamino)dichlorophosphine 5.

AD-A200 195

*ORGANOMETALLIC COMPOUNDS

Compound Semiconductor Materials, Devices and Circuits. *

AD-A187 840

Photochemical Generation of Nineteen-Electron Organometallic Complexes and Their Use as Reducing Agents in Micellar Systems.

AD-A197 885

Reprint: Photochemistry of Organometallic Halide Complexes. Mechanisms for the Formation of Ionic Products.

AD-A188 488

Reprint: Synthesis of Trifluorostyryl Organometallic Complexes from Trifluorostyryl Radicals and Metal Atoms.

AD-A198 560

Reprint: Dialkylamino Phosphorus Metal Carbonyls. 4. Novel Phosphorus-Bridging Carbonyl Derivatives and Triphosphine Derivatives from Reactions of Tetracarbonylferrate(-II) with (Dialkylamino)dichlorophosphines 1-4.

AD-A198 564

Ceramics Derived from Organometallic Polymers. *

AD-A200 118

Reprint: Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 74. Salts of the

SUBJECT INDEX-27
UNCLASSIFIED EVJ00F

OPT-ORG

Anions (W(Triple Bond
 $\text{Cr}(\text{CO})_2(\text{Et}(\text{S})-\text{C}_2\text{B}_9\text{H}_9\text{Me}_2))$ -
 $(\text{R}=\text{C}_6\text{H}_4\text{Me}-2 \text{ or } \text{C}_6\text{H}_3\text{Me}_2-2,6)$ as
 Reagents for the Synthesis of
 Compounds with Heteronuclear Metal-
 Metal Bonds: Crystal Structure of
 $(\text{N}(\text{Et})_4)-(\text{FeW}(\mu-\text{CC}_6\text{H}_3\text{Me}_2-2,6)(\text{CO})_5(\text{Et}(\text{S})-\text{C}_2\text{B}_9\text{H}_9\text{Me}_2))$.
 AD-A200 218

Reprint: Summary Abstract: The
 Adsorption and Decomposition of
 Molybdenum Hexacarbonyl on Mo and
 Si Surfaces.
 AD-A200 358

The Reactivity of Transition
 Metal-Silicon Compounds.*
 AD-A200 371

*OSCILLATORS
 Structure Dynamics of Excited
 Atoms.*
 AD-A198 147

*OXIDES
 Reprint: Material Constraints on
 Electronic Applications of Oxide
 Superconductors.
 AD-A200 538

*OXIMES
 Reprint: An Ab Initio Study of
 the Structure and Bonding of
 Pralidoxime and Its Conjugate Base.
 AD-A200 532

*OXYGEN
 Reprint: Anomalies in the Heat-
 Capacity Signatures of Submonolayer
 Adsorbates with Attractive Lateral
 Interactions.
 AD-A198 382

Reprint: Fragmentation of
 Molecular Adsorbates by Electron
 and Ion Bombardment: Methoxy
 Chemistry on Al(111).
 AD-A199 728

*PARALLEL PROCESSING
 Optical Acquisition, Image and
 Data Compression.*
 AD-A198 893

Massive Symbolic Mathematical
 Computations and Their
 Applications.*
 AD-A200 253

*PARALLEL PROCESSORS
 Optical Acquisition, Image and
 Data Compression.*
 AD-A199 993

*PARAMETRIC ANALYSIS
 A Note on Second Order Effects
 in a Semiparametric Context.*
 AD-A198 018
 On Lifetimes Influenced by a
 Common Environment.*
 AD-A198 273

*PARTICLE BEAMS
 The University of New Hampshire
 Vacuum Chamber and Charged Particle
 Calibration Source.*
 AD-A199 823

*PARTICULATES
 Small Strain Response of Random
 Arrays of Elastic Spheres Using a
 Nonlinear Distinct Element
 Procedure.*
 AD-A198 281

*PENTADIENES
 Reprint: Potentially Aromatic
 Metalloacycles.
 AD-A197 785

Reprint: Structural Assignment
 of a Methylcyclopentadiene-
 Toluquinone Diels-Adler
 Cycloadduct. Analysis of the Two-
 Dimensional NMR Spectrum of 1,6-
 Dimethyl-1 alpha, 4 alpha, 4a
 alpha, 5 alpha, 8 beta, 8a alpha-
 hexahydro-1, 4-methanonaphthalene-
 5,8-diol.
 AD-A197 794

Reprint: Mechanism of the 1,5-
 Sigmatropic Hydrogen Shift in 1,3-
 Pentadiene.
 AD-A200 194

Reprint: Diels-Alder Reactions
 of 1,1-dimethyl-2,3,4,5-tetraphenyl-

1-silacyclopentadiene, 1,1-
 dimethyl-2,5-diphenyl-1-
 silacyclopentadiene and 1,1-
 dimethyl-3,4-diphenyl-1-
 silacyclopentadiene with Maleic
 Anhydride; Kinetic Measurements.
 AD-A200 385

*PERCEPTION (PSYCHOLOGY)
 Context Effects in Recognizing
 Syllable-Final /z/ and /s/ in
 Different Phrasal Positions.*
 AD-A198 923

*PHARMACOKINETICS
 Validation and Application of
 Pharmacokinetic Models for
 Interspecies Extrapolations in
 Toxicity Risk Assessments of
 Volatile Organics.*
 AD-A200 034

*PHARMACOLOGY
 Behavioral Consequences of
 Neurotransmitter Regulation.*
 AD-A200 374

*PHENYL RADICALS
 Rheological, Rheo-Optical and
 Light Scattering Studies on Nematic
 Solutions of Poly(1,4-Phenylene-2,6-
 Benzobisthiazole).
 AD-A198 380

*PHONETICS
 Context Effects in Recognizing
 Syllable-Final /z/ and /s/ in
 Different Phrasal Positions.*
 AD-A198 923

*PHOSPHINE
 Photochemical Disproportionation
 Reactions of the $\text{W}(\text{CO})_6(2-)$ and
 $\text{Fe}_2(\text{CO})_8(2-)$ Complexes.*
 AD-A197 800
 Reprint: Novel
 $((\text{Diisopropylamino})\text{triphenylhexa-}$
 $\text{carbonyliron Complexes.}$
 AD-A197 897
 Reprint: Dialkylamino Phosphorus
 Metal Carbonyls. 8. Chemistry of

(Tris(diisopropylamino)triphosphine)d
Iron Hexacarbonyl Derivatives
Including the Synthesis and
Structure of Heterometallic
Derivatives 1-4.
AD-A198 581

Reprint: Dialkylamino Phosphorus
Metal Carbonyls. 1. Mononuclear
Derivatives from Reactions of
Bis(diisopropylamino)phosphine with
Metal Carbonyls.
AD-A198 583

Use of D2 to Elucidate OH/VE
(organometallic Vapor Phase
Epitaxial) Growth Mechanisms.*
AD-A198 841

*PHOSPHORUS

Reprint: Observation of
Molecular Rotors on Surfaces by
ESDIAD (Electron Stimulated
Desorption Ion Angular
Distribution): Studies of PF3 and
NH3 Chemisorption on Ni Surfaces.
AD-A198 505

Reprint: Dialkylamino Phosphorus
Metal Carbonyls. 6. Chemistry of
(Tris(diisopropylamino)triphosphine)d
Iron Hexacarbonyl Derivatives
Including the Synthesis and
Structure of Heterometallic
Derivatives 1-4.
AD-A198 581

*PHOTOCHEMICAL REACTIONS

Reprint: Size, Shape and Site
Selectivities in the Photochemical
Reactions of Molecules Adsorbed on
Pentasil Zeolites.
AD-A197 758

Photochemical Generation of
Nineteen-Electron Organometallic
Complexes and Their Use as Reducing
Agents in Micellar Systems.
AD-A197 885

Reprint: Photoionization of the
Valence Orbitals of OH.
AD-A198 331

Ionization Rates Relevant to
Laser Cooling of Hydrogen.*
AD-A198 481

Reprint: Photochemistry of
Organometallic Halide Complexes.
Mechanisms for the Formation of
Ionic Products.
AD-A198 488

Reprint: Competition among
Collisional Deactivation,
Ionization, and Dissociation in the
Multiphoton Excitation of
Octafluorocyclooctatetraene.
AD-A200 508

*PHOTODEGRADATION

Reprint: Femtosecond Real-Time
Dynamics of Photofragment-Trapping
Resonances on Dissociative
Potential Energy Surfaces.
AD-A198 020

*PHOTODISSOCIATION

Reprint: Time Dependent
Absorption of Fragments During
Dissociation.
AD-A198 329

Reprint: Energetics and Spin-
and Lambda-Doublet Selectivity in
the Infrared Multiphoton
Dissociation HN3(X 1A) Yields N2(X
1 Sigma sub g(+)) + NH(X 3 Sigma(-
), A 1 Delta): Theory.
AD-A198 523

*PHOTOELECTRIC EMISSION

Investigations of the Optical
and Electronic Properties of
Crystalline Organic Materials.*
AD-A200 074

*PHOTOELECTRON SPECTRA

Reprint: Atomic and Molecular
Alignment from Photoelectron
Angular Distributions in (n+1)
Resonantly Enhanced Multiphoton
Ionization.
AD-A198 277

*PHOTOELECTRONS

Reprint: (1+1) Resonant Enhanced
Multiphoton Ionization via the A 2
Sigma+ State of NO: Ionic
Rotational Branching Ratios and

Their Intensity Dependence.
AD-A198 453

*PHOTOIONIZATION

Reprint: Atomic and Molecular
Alignment from Photoelectron
Angular Distributions in (n+1)
Resonantly Enhanced Multiphoton
Ionization.
AD-A198 277

Reprint: Ionic Rotational
Branching Ratios in Resonant
Enhanced Multiphoton Ionization of
NO via the A 2Sigma+ (3s sigma)
and D 2Sigma+ (3p sigma) States.
AD-A198 330

Reprint: Photoionization of the
Valence Orbitals of OH.
AD-A198 331

Modeling of Atomic Processes for
X-Ray Laser Plasmas.*
AD-A200 218

*PHOTOLYSIS

Reprint: Vector Correlations in
the Photodissociation of CH3I, OCS,
and Glyoxal.
AD-A198 332

Reprint: State-Selective Studies
of γ Yields R, V Energy Transfer:
The H + CO System.
AD-A198 373

Reprint: Photochemistry of
Benzocyclobutene.
AD-A198 507

The Kinetics and Dynamics of
Iodine Monofluoride Formation in
Gas-Phase Collisions.*
AD-A198 822

*PHOTON BOMBARDMENT

Electronic Interactions of
Electrons, Photons, and Atoms with
Material Surfaces.*
AD-A198 828

*PHTHALOCYANINES

P8Y, P8O-Based Hybrid Polymers
with Nonlinear Optical Properties
or High Electrical Conductivity.*
AD-A200 228

SUBJECT INDEX-29
UNCLASSIFIED EVJ00F

PHO-PHT

***PLANE WAVES**

Reprint: The Inverse Scattering Problem for Time-Harmonic Acoustic Waves in an Inhomogeneous Medium.
AD-A200 335

***PLASMA WAVES**

Electromechanical Feedback Processes in the Ionosphere.*
AD-A199 235

***PLASMAS(PHYSICS)**

Opening Switch Research on a Plasma Focus VI.*
AD-A198 155

Fundamental Processes in Partially Ionized Plasmas.*
AD-A198 627

Experimental Study of Plasmoid Formation and Transport by Means of Moving Magnetic Fields.*
AD-A200 005

Experimental Study of Plasmoid Formation and Transport by Means of Moving Magnetic Fields.*
AD-A200 005

Modeling of Atomic Processes for X-Ray Laser Plasmas.*
AD-A200 219

***PLASTIC PROPERTIES**

Constitutive Modelling of Joints under Cyclic Loading. Part 2. Further Development of Hierarchical Plasticity Model for Joints.*
AD-A200 233

***PLATINUM**

Reprint: Studies of L-DOPA and Related Compounds Adsorbed from Aqueous Solutions at Pt(100) and Pt(111): Electron Energy-Loss Spectroscopy, Auger Spectroscopy, and Electrochemistry.
AD-A198 501

Reprint: Electron Stimulated Desorption from CO Chemisorbed on Pt(111): A Dynamical Study of Positive Ion and Metastable CO emission.
AD-A198 729

***POISSON DENSITY FUNCTIONS**

Reprint: A Martingale Characterization of Mixed Poisson Processes.
AD-A198 022

On Exceedance Point Processes for Stationary Sequences under Mild Oscillation Restrictions.*
AD-A198 314

Reprint: On the Distance between Poisson and Poisson Distributions.
AD-A198 389

A Counterexample Concerning the External Index.*
AD-A200 076

***POISSON EQUATION**

On a Correlation Inequality and Its Applications.*
AD-A198 285

***POLARIZATION**

Laser Measurements of Transient High-Strength Electric Fields.*
AD-A198 267

The Physics of Spin Polarized Atomic Vapors.*
AD-A199 550

***POLYATOMIC MOLECULES**

Reprint: (1+1)CDAD: A New Technique for Studying Photofragment Alignment.
AD-A198 273

Reprint: Basis Set Effects and the Choice of Reference Geometry in Ab Initio Calculations of Vibrational Spectra.
AD-A198 236

***POLYCYCLIC COMPOUNDS**

Reprint: Synthesis and Chemistry of Novel Polynitropolycyclic Cage Molecules.
AD-A197 656

Reprint: Transannular Cyclizations in the Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9))undecane-8,11-Dione System: A reinvestigation.
AD-A198 026

***POLYESTER PLASTICS**

Reprint: Synthesis of Side Chain Liquid Crystal Polymers for Nonlinear Optics.
AD-A200 366

***POLYMERIC FILMS**

Monolayer and Langmuir-Blodgett Multilayer Surface and Spectral Studies of Poly-3-BCMU.
AD-A198 801

***POLYMERIZATION**

Reprint: Anionic Ring-Opening Polymerization of Sila- and Germacyclopent-3-enes.
AD-A197 874

Reprint: Formation and Electrochemistry of Polyfluorene in Ambient Temperature Ionic Liquids.
AD-A198 383

Reprint: Pyridine N-Oxides as Polymeric Nonlinear Optical Materials.
AD-A200 387

***POLYMERS**

Reprint: Rheological and Rheo-Optical Studies with Nematogenic Solutions of a Rodlike Polymer: A review of Data on Poly (Phenylene Benzobisthiazole).
AD-A157 964

Reprint: Absorption of Gaseous Iodine by Polythiophene Films and Powders.
AD-A158 218

Organic and Polymeric Nonlinear Optical Materials: a Topical Workshop Held in Virginia Beach, Virginia on May 16-19, 1988.*
AD-A158 305

Reprint: Stimulated EPR (electron Paramagnetic Resonance) Electrochemical Measurements on Polypyrrole in Ambient Temperature Ionic Liquids.
AD-A193 323

Crazing in Polymeric and Composite Systems.*
AD-A193 372

Reprint: Thermodynamically Reversible Uptake of Electrically Active Dopants in Conducting Polymers: Iodine in Polythiophene. AD-A198 378

Reprint: Formation and Electrochemistry of Polyfluorene in Ambient Temperature Ionic Liquids. AD-A198 383

Reprint: Third-Order Nonlinear Optical Effects in Organic Polymeric Films. AD-A198 384

Reprint: Holes, Electrons, Polarons, and Bipolarons and the Thermodynamics of Electrically Active Dopants in Conducting Polymers. AD-A198 402

Reprint: Nematic Solutions of Rodlike Polymers Light Scattering from Nematic Solutions with Complex Texture and Phase Separation in Poor Solvents. AD-A198 454

Reprint: Rheological Studies on Blends of Rodlike and Flexible Chain Polymers. AD-A198 455

Reprint: Frank Elastic Constants and Leslie-Ericksen Viscosity Coefficients of Nematic Solutions of a Rodlike Polymer. AD-A198 461

Polyallylated Unsaturated Molecules.* AD-A198 492

Novel Liquid Crystals - Polymers and Monomers - As Nonlinear Optical Materials.* AD-A200 075

Ceramics Derived from Organo-Metallic Polymers.* AD-A200 118

PBT, PBO-Based Hybrid Polymers with Nonlinear Optical Properties or High Electrical Conductivity.* AD-A200 228

Development of Conducting Polymers of High Structural Strength.*

AD-A200 310

*POROSITY

Microstructure, Porosity and Mechanical Property Relationships of Calcium-Silicate-Hydrate.* AD-A200 120

*POROUS MATERIALS

Reprint: Use of Electron Spin Resonance Spectroscopy to Study the Photochemistry of Adsorbed Dibenzyl Ketone on Porous Silica. AD-A198 220

*POTENTIAL ENERGY

Reprint: Cellular Mechanisms of Noradrenergic Enhancement of Long-Term Synaptic Potentiation in Hippocampus. AD-A197 191

Reprint: Norepinephrine Enhances Long-Term Potentiation at Hippocampal Mossy Fiber Synapses. AD-A197 990

*PREDICTIONS

Applications of Operator Theory to Maximum Entropy Problems.* AD-A200 586

*PROBABILITY

Remarks on the Positivity of Densities of Stable Probability Measure on $R(d)$.* AD-A197 920

*PROBABILITY DISTRIBUTION FUNCTIONS

Weighted and Clouded Distributions.* AD-A198 321

*PROBES

Regulation of Voltage-Dependent Channel Function.* AD-A200 375

*PROBLEM SOLVING

Optimum acceleration factors for iterative solutions of linear and non-linear systems.*

AD-A198 408

*PROCESSING

MBE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.* AD-A198 421

Investigation of Defect and Electronic Interactions Associated with GaAs Device Processing.* AD-A200 541

*PROJECTIVE GEOMETRY

Linear Transformations, Projection Operators and Generalized Inverses; A Geometric Approach.* AD-A197 808

*PROPELLANTS

Fundamental Studies of Carbon, NH₃, and Oxygen Rings and Other High Energy Density Molecular Systems.* AD-A200 331

*PROPENES

Reprint: Basis Set Effects and the Choice of Reference Geometry in Ab Initio Calculations of Vibrational Spectra. AD-A199 238

*PROTONS

Reprint: Removal of Protons from Ambient-Temperature Chloroaluminate Ionic Liquids. AD-A198 451

*PSYCHOLOGICAL TESTS

Individual Differences in Attention.* AD-A199 824

*PSYCHOPHYSICS

Higher Order Mechanisms of Color Vision.* AD-A198 063

*PULSE GENERATORS

SUBJECT INDEX-31
UNCLASSIFIED EVJ00F

POR-PUL

UNCLASSIFIED

Mega-Amp Opening Switch with
Nested Electrodes/Pulsed Generator
of Ion and Ion Cluster Beams.*
AD-A198 485

*PULSED LASERS
Intense XUV Radiation Sources.*
AD-A200 292

*PUMPING(ELECTRONICS)
Modeling of Atomic Processes for
X-Ray Laser Plasmas.*
AD-A200 219

*QUANTUM CHEMISTRY
Reprint: A Nomenclature for
Lambda-Doublet Levels in Rotating
Linear Molecules.
AD-A199 838
Reprints: AM1 Calculations for
Compounds Containing Boron.
AD-A200 196
Fundamental Studies of Carbon,
NH₄, and Oxygen Rings and Other High
Energy Density Molecular Systems.*
AD-A200 331

*QUANTUM ELECTRODYNAMICS
Fundamental Quantum V/F Noise in
Ultra-small Semiconductor Devices
and Their Optimal Design
Principles.*
AD-A198 482

*QUANTUM ELECTRONICS
Adaptive Hybrid Picture Coding.*
AD-A200 059
Semiconductor Alloy Engineering
for High-Speed Devices.*
AD-A200 358
Studying Quantum Phase-based
Electronic Devices.*
AD-A200 376

*QUARTZ
Research on Sputtering of
Ferroelectric Thin Films.*
AD-A197 899

*QUINONES
Reprint: Characterization of

Hydroquinone and Related Compounds
Adsorbed at Pt(111) from Aqueous
Solutions: Electron Energy-Loss
Spectroscopy, Auger Spectroscopy,
Low-Energy Electron Diffraction,
and Cyclic Voltammetry.
AD-A197 715

*RADIATION ABSORPTION
Reprint: Line Shape of an Atom-
Crystal Bond.
AD-A200 382

*RADIOFREQUENCY GENERATORS
Experimental Study of Plasmoid
Formation and Transport by Means of
Moving Magnetic Fields.*
AD-A200 005

*RAMAN SPECTRA
Laser Measurements of Transient
High-Strength Electric Fields.*
AD-A198 247

*RAMAN SPECTROSCOPY
In-Situ Surface during Laser-
Controlled Chemical Processing of
Surfaces.*
AD-A200 206

*RANGE(DISTANCE)
Reprint: On the Distance between
Poisson and Poisson Distributions.
AD-A198 369

*RANK ORDER STATISTICS
Detection of Change Points Using
Rank Methods.*
AD-A198 406

*RARE EARTH ELEMENTS
Reprint: Dynamics of Interaction
between a 1,9-Biradical and
Lanthanide Ions.
AD-A198 065

*RARE GASES
Reprint: Collisional-Induced
Absorption in Calcium Rare-Gas
Collisions.
AD-A199 831

The Physics of Spin Polarized
Atomic Vapors.*
AD-A199 990

*RAYLEIGH SCATTERING
Laser Measurements of Transient
High-Strength Electric Fields.*
AD-A198 247

*RAYLEIGH WAVES
Reprint: Lattice Vibrations in
Thin-Film Carbon: Electron-Rayleigh-
Wave Interaction.
AD-A198 269

*REACTION KINETICS
Aerodynamic and Kinetic
Processes in Flames.*
AD-A198 474

Reprint: Trajectory Studies of
Unimolecular Reactions of Si₂H₄ and
SiH₂ on a Global Potential Surface
to Ab Initio and Experimental Data.
AD-A200 369

*REACTION TIME
Changes in Somatosensory
Responsiveness in Behaving
Primates.*
AD-A198 792

*RECOGNITION
A 3-D Object Recognition System
Using Aspect Graphs.*
AD-A198 472

*RECOMBINATION REACTIONS
Reprint: Computational Studies
of SiH₂+SiH₂ Recombination Reaction
Dynamics on a Global Potential
Surface Fitted to Ab Initio and
Experimental Data.
AD-A198 377

Fundamental Processes in
Partially Ionized Plasmas.*
AD-A198 827
Cooling of Atomic Processes for
X-Ray Laser Plasmas.*
AD-A200 219

Merged Beam Studies of the
Dissociative Recombination of H₃(+)

SUBJECT INDEX-32
UNCLASSIFIED EVJ00F

PUL-REC

and H2(+). *
AD-A200 526

*RECRUITS
Individual Differences in
Attention. *
AD-A198 624

*REFLEXES
Bioreactivity: Studies on a
Simple Brain Stem Reflex in
Behaving Animals. *
AD-A198 404

*REFRACTION
Optical Beam Phase-Conjugation
and Electromagnetic Scattering
Process with Intense Fields. *
AD-A200 372

*REFRACTIVE INDEX
Long Term Studies of the
Refractive Index Structure
Parameter in the Troposphere and
Stratosphere. *
AD-A198 313

*REGRESSION ANALYSIS
Identifying Nonlinear Covariate
Effects in Semimartingale
Regression Models. *
AD-A197 323
A Quick and Easy Multiple Use
Calibration Curve Procedure. *
AD-A198 227
Variance Function Estimation in
Regression: The Effect of
Estimating the Mean. *
AD-A198 228
Reprint: Variance Function
Estimation.
AD-A198 822
Reprint: A Note on Computing
Robust Regression Estimates via
Iteratively Reweighted Least
Squares.
AD-A200 161

*RELAXATION
The Physics of Spin Polarized
Atomic Vapors. *

AD-A198 990

*RELIABILITY
Reprint: Reliability of Complex
Devices in Random Environments.
AD-A198 558

*REMOTE DETECTORS
Reprint: Equatorial Semiannual
Oscillation in Zonally Averaged
Temperature Observed by the Nimbus
7 SAMS (Stratospheric and
Mesospheric Sounder) and LIMS (Limb
Infrared Monitor of the
Stratosphere).
AD-A200 587

*RESEARCH MANAGEMENT
National Research Council
Resident Research Associateship
(NRC-RRR) Program. *
AD-A200 183

*RESONANCE
Reprint: Memory-Induced Extra
Resonances of Adsorbates.
AD-A198 211
Reprint: Effects of Autoionizing
Resonances on Electron-Impact
Excitation Rates for Be-Like Ions.
AD-A198 407

*RESONANCE RADIATION
Reprint: Femtosecond Real-Time
Observation of Wave Packet
Oscillations (Resonance) in
Dissociation Reactions.
AD-A197 717
Reprint: (1+1) Resonant Enhanced
Multiphoton Ionization via the A 2
Sigma + State of NO: Ionic
Rotational Branching Ratios and
Their Intensity Dependence.
AD-A198 453

*RETINA
Role of Retinocortical
Processing in Spatial Vision. *
AD-A200 198

*RHEOLOGY

Reprint: Rheological and Rheo-
Optical Studies with Nematogenic
Solutions of a Rodlike Polymer: A
Review of Data on Poly (Phenylene
Benzobisthiazole).
AD-A197 994

Rheological, Rheo-Optical and
Light Scattering Studies on Nematic
Solutions of Poly(1,4-Phenylene-2,6-
Benzobisthiazole). *

AD-A198 380
Reprint: Rheological Studies on
Blends of Rodlike and Flexible
Chain Polymers.
AD-A198 455

*ROCK
Constitutive Modelling of Joints
under Cyclic Loading. Part 2.
Further Development of Hierarchical
Plasticity Model for Joints. *
AD-A200 233
Constitutive Modelling of Joints
under Cyclic Loading. Part 4.
Development of Simulated Rock Like
Material and Testing. *
AD-A200 235

*ROCK MECHANICS
Constitutive Modelling of Joints
under Cyclic Loading. Part 1.
Modelling and Testing of Idealized
Rock Joints. *
AD-A200 232

*ROCKET ENGINES
Cyclic Deformation, Damage, and
Effects of Environment in the NI3Al
Ordered Alloy at Elevated
Temperatures. *
AD-A198 500

*ROTOR BLADES
Nonlinear Dynamic Responses of
Composite Rotor Blades. *
AD-A200 145

*SALTS
Reprint: Chemistry of
Polynuclear Metal Complexes with
Bridging Carbene or Carbyne

SUBJECT INDEX-33
UNCLASSIFIED EVJ00F

REC-SAL

UNCLASSIFIED

Ligands. Part 74. Salts of the Anions (W(Triple Bond CR)(CO)2(Eta(5)-C2B9H9Me2))-(R-C6H4Me-2 or C6H3Me2-2,6) as Reagents for the Synthesis of Metal Bonds: Crystal Structure of (N(Et)4)-(FeW(mu-CC6H3Me2-2,6)(CO)5(Eta(5)-C2B9H9Me2)). AD-A200 218

SAND Deformation Behavior of Sands under Cyclic Loading - A Micro-Structural Approach. AD-A199 999
Constitutive Behavior of Fiber Reinforced Sands.* AD-A200 524

SAPPHIRE Tunneling Microscopy of Superconductors and Tunneling Barriers. AD-A197 686

SCALING FACTORS Geotechnical Centrifuge Modeling of Explosion Induced Craters - A check for Scaling Effects. AD-A200 290

*SCATTERING Reprint: Dynamics of Chemisorption/Scattering of Atomic Hydrogen on Partially Covered Si(111) Surfaces. AD-A198 297

*SCORING Reprint: Conditional Scores and Optimal Scores for Generalized Linear Measurement-Error Models. AD-A198 379

SEALS(STOPPERS) The Measurement and Prediction of Rotodynamic Forces for Labyrinth Seals. AD-A197 185

SEARCHING Optics and Symbolic Computing. AD-A200 584

SEISMIC ARRAYS Development and Evaluation of a New Regional Seismic Array in Fennoscandia. AD-A199 881

SEMICONDUCTING FILMS Investigation of a New Concept in Semiconductor Microwave Oscillators. AD-A198 039
Superconducting Electronic Film Structures.* AD-A200 534

SEMICONDUCTOR DEVICES Fundamental Quantum 1/F Noise in Ultrasmall Semiconductor Devices and Their Optimal Design Principles. AD-A198 482

SEMICONDUCTORS Compound Semiconductor Materials, Devices and Circuits. AD-A197 840
Investigation of a New Concept in Semiconductor Microwave Oscillators.* AD-A198 038
Crystal Growth and Mechanical Properties of Semiconductor Alloys.* AD-A198 153
Joint Service Electronics Program: Research in Electronics.* AD-A199 859
Investigations of the Optical and Electronic Properties of Crystalline Organic Materials.* AD-A200 074
Semiconductor Alloy Engineering for High-Speed Devices.* AD-A200 358

*SENSES(PHYSIOLOGY) Eye Movements and Visual

Information Processing.* AD-A200 008

SHAKING Motion and Stability of Saturated Soil Systems Under Dynamic Loading. AD-A200 293

SIGNAL PROCESSING Research on the Statistics of Grain Lattice Echoes and Their Use in Grain Size Estimation and Grain Echo Suppression. AD-A199 811

*SILANES Reprint: The Electronic and Molecular Structure of Silyl Nitrene. AD-A198 270

Reprint: Synthesis of Trifluorosilyl Organometallic Complexes from Trifluorosilyl Radicals and Metal Atoms. AD-A198 580

Reprint: Mechanism of the Thermal Decomposition of Dimethylsilane at Atmospheric Pressures in the Gas Phase. AD-A200 197
Reprint: A New Route to 1,4-Disilabenzenes and 1,4-Disilabarelenes. AD-A200 207

SILICON Tunneling Microscopy of Superconductors and Tunneling Barriers. AD-A197 686
Reprint: Theoretical Studies of Silabicyclobutanes and Silabicyclobutenes, CnSi(4-n)H8 (n = 0-4). AD-A197 953
Reprint: Dynamics of Chemisorption/Scattering of Atomic Hydrogen on Partially Covered Si(111) Surfaces. AD-A198 297

SUBJECT INDEX-34
UNCLASSIFIED EVJ00F

SAN-SIL

Reprint: Computational Studies of SiH_2 - SiH_2 Recombination Reaction Dynamics on a Global Potential Surface Fitted to Ab Initio and Experimental Data.
AD-A198 377

Reprint: Desorption of a Two-State System: Laser Probing of Gallium Atom Spin-Orbit States from Silicon (100).
AD-A198 239

Investigations of the Optical and Electronic Properties of Crystalline Organic Materials.*
AD-A200 074

Semiconductor Alloy Engineering for High-Speed Devices.*
AD-A200 356

*SILICON COMPOUNDS

Reprint: Computational Studies of SiH_2 - SiH_2 Recombination Reaction Dynamics on a Global Potential Surface Fitted to Ab Initio and Experimental Data.
AD-A198 377

Polysilylated Unsaturated Molecules.*
AD-A198 452

The Reactivity of Transition Metal-Silicon Compounds.*
AD-A200 371

*SILICON DIOXIDE

Reprint: Use of Electron Spin Resonance Spectroscopy to Study the Photochemistry of Adsorbed Dibenzyl Ketone on Porous Silica.
AD-A198 220

Ultrastructure Processing and Environmental Stability of Advanced Structural and Electronic Materials.*
AD-A199 905

Ceramics Derived from Organometallic Polymers.*
AD-A200 118

*SILICON NITRIDES

Mechanistic Studies of Pressure-Assisted Superplasticity of

Structural Ceramics.*
AD-A200 202

*SIMULATION

Investigations of the Motion of Discrete-Velocity Gases by Cellular Automata.*
AD-A200 221

Constitutive Modelling of Joints under Cyclic Loading. Part 4. Development of Simulated Rock Like Material and Testing.*
AD-A200 235

*SINGLE CRYSTALS

Reprint: UHV Transport System for Laser Irradiation Studies.
AD-A200 330

*SLOSHING

Investigation of Liquid Sloshing in Spin-Stabilized Satellites.*
AD-A199 629

*SODIUM

Reprint: Electronic Assignments of the Violet Bands of Sodium.
AD-A199 839

*SODIUM BOROHYDRIDES

Reprint: Transannular Cyclizations in the Pentacyclo[5.4.0.0(2,6).0(3,10).0(5,9)]undecane-8,11-Dione System: A reinvestigation.
AD-A198 026

Reprint: Reductive Amination of Pentacyclo[5.4.0.0(2,6).0(3,10).0(5,9)]undecane-8,11-dione.
AD-A198 222

*SODIUM SULFATES

Reprint: Dynamics of Interaction between a 1,9-Biradical and Lanthanide Ions.
AD-A198 066

*SOIL DYNAMICS

Motion and Stability of Saturated Soil Systems Under Dynamic Loading.*

AD-A200 293

*SOIL MECHANICS

Gast Induced Liquefaction of Soils: Laboratory and Field Tests.*
AD-A199 995

Constitutive Modelling of Joints under Cyclic Loading. Part 1. Modelling and Testing of Idealized Rock Joints.*
AD-A200 232

*SOIL STABILIZATION

Constitutive Behavior of Fiber Reinforced Sands.*
AD-A200 524

*SOILS

Constitutive Modelling of Joints under Cyclic Loading. Part 2. Further Development of Hierarchical Plasticity Model for Joints.*
AD-A200 233

*SOLID STATE ELECTRONICS

Transport and Junction Physics of Semiconductor-Metal Eutectic Composites.*
AD-A198 480

*SOLID STATE LASERS

Tunable Solid State Lasers and Synthetic Nonlinear Materials.*
AD-A199 992

*SOLUTIONS(GENERAL)

Ordering Methods for Sparse Matrices and Vector Computers.*
AD-A198 291

*SOOT

Aerodynamic and Kinetic Processes in Flames.*
AD-A198 474
Investigation of Fuel Additive Effects on Sooting Flames.*
AD-A200 273

*SPACE ENVIRONMENTS

Topical Meeting on Optics in Adverse Environments: Summaries of

SUBJECT INDEX-35
UNCLASSIFIED EVJ00F

SIL-SPA

UNCLASSIFIED

Papers Presented at the Optics in Adverse Environments Topical Meeting Held in Albuquerque, New Mexico on 11-12 February 1987. Technical Digest Series. Volume 8.*
AD-A197 119

*SPACE HEATERS
Reprint: Urban Climate Effects of Energy Demand for Space Heating.
AD-A200 333

*SPACE SHUTTLES
Shuttle Flight Test of an Advanced Gamma-Ray Detection System.*
AD-A198 399

*SPACE STATIONS
A New Approach to the Analysis and Control of Large Space Structures. Phase 1.*
AD-A198 143
Adaptive Control Techniques for Large Space Structures.*
AD-A200 208

*SPACE TECHNOLOGY
The University of New Hampshire Vacuum Chamber and Charged Particle Calibration Source.*
AD-A199 623

*SPACECRAFT
Algorithms for Robust Identification and Control of Large Space Structures. Phase 1.*
AD-A198 130
A New Approach to the Analysis and Control of Large Space Structures. Phase 1.*
AD-A198 143

*SPARSE MATRIX
Ordering Methods for Sparse Matrices and Vector Computers.*
AD-A198 291

*SPECTROMETERS
Investigations of the Dynamics and Thermodynamics of CO₂

Mesosphere and Upper Thermosphere at the Polar Regions.*
AD-A198 483
Spectroscopic and Light Scattering Instrumentation Proposal.*
AD-A199 991

*SPECTROSCOPY
Opening Switch Research on a Plasma Focus VI.*
AD-A198 155

Reprint: The Chemistry of Water in Ambient-Temperature Chloraluminate Ionic Liquids: NMR studies.
AD-A198 324

Reprint: Ultrafast Laser Spectroscopy of Chemical Reactions.
AD-A198 328

Reprint: Two-Photon-Excited Fluorescence Spectroscopy of Atomic Fluorine at 170 nm.
AD-A199 240

Reprint: High Resolution Spectroscopic Studies of Small Molecules.
AD-A199 837

*SPEECH RECOGNITION
Context Effects in Recognizing Syllable-Final /z/ and /s/ in Different Phrasal Positions.*
AD-A199 923

*SPHERES
Small Strain Response of Random Arrays of Elastic Spheres Using a Nonlinear Distinct Element Procedure.*
AD-A198 281

*SPIN STATES
Reprint: Desorption of a Two-State System: Laser Probing of Gallium Atom Spin-Orbit States from Silicon (100).
AD-A199 239
The Physics of Spin Polarized Atomic Vapors.*
AD-A199 990

*SPINNING(MOTION)
Investigation of Liquid Sloshing in Spin-Stabilized Satellites.*
AD-A199 829

*SPUTTERING
Research on Sputtering of Ferroelectric Thin Films.*
AD-A197 899

*STARK EFFECT
Compound Semiconductor Materials, Devices and Circuits.*
AD-A197 840

*STATISTICAL ANALYSIS
Reprint: Discussion of Box's 1987 Article in Technometrics.
AD-A199 823

*STATISTICAL DISTRIBUTIONS
Reprint: Test of Equal Gamma-Distribution Means with Unknown and Unequal Shape Parameters.
AD-A200 388

*STATISTICAL PROCESSES
Reprint: A Martingale Characterization of Mixed Poisson Processes.
AD-A198 022

Reprint: Level Crossings of Filtered Dichotomous Noise.
AD-A198 188

Reprint: Tail Behaviour for the Suprema of Gaussian Processes with Applications to Empirical Processes.
AD-A200 511

*STIMULATION(PHYSIOLOGY)
Neurophysiological Research Supporting the Investigation of Adaptive Network Architectures.*
AD-A199 878

*STOCHASTIC CONTROL
Reprint: Adaptive Policies for Discrete-Time Stochastic Control Systems with Unknown Disturbance Distribution.

SUBJECT INDEX-38
UNCLASSIFIED EVJ00F

SPA-STO

- AD-A198 069
Reprint: Unified Optimal Projection Equations for Simultaneous Reduced-Order, Robust Modelling Estimation and Control.
AD-A198 381
- *STOCHASTIC PROCESSES
On Functional Estimates for Ill-Posed Linear Problems.*
AD-A198 004
Reprint: On Adaptive Control of Stochastic Bilinear Systems.
AD-A198 074
Robust Algorithms for Detecting a Change in a Stochastic Process with Infinite Memory.*
AD-A198 290
Reprint: Adaptive Control of Stochastic Bilinear Systems.
AD-A198 387
A Langevin-Type Stochastic Differential Equation on a Space of Generalized Functionals.*
AD-A199 809
Reprint: Degenerate Multivariate Stationary Processes: Basicity, Past and Future, and Autoregressive Representation.
AD-A199 929
A Counterexample Concerning the External Index.*
AD-A200 076
Harmonizability, V-Boundedness, (2P)-Boundedness of Stochastic Processes.*
AD-A200 077
Diffusion Equations in Duals of Nuclear Spaces.*
AD-A200 078
Reprint: Stochastic Evolution Equations Driven by Nuclear-Space-Valued Martingales.
AD-A200 336
On a Wide Range Exclusion Process in Random Medium with Local Jump Intensity.*
AD-A200 510
- *STRENGTH(MECHANICS)
Dispersion Strengthening of High
- Temperature Niobium Alloys.*
AD-A199 958
- *STRESS ANALYSIS
Anisotropy and Stress Path Effects in Clays with Applications to the Pressuremeter Test.*
AD-A199 628
Strength and Deformation of Confined and Unconfined Concrete Under Axial Dynamic Loading.*
AD-A199 930
- *STRESS(PSYCHOLOGY)
Bioreactivity: Studies on a Simple Brain Stem Reflex in Behaving Animals.*
AD-A199 404
- *STRIP TRANSMISSION LINES
Millimeter Wave Generation Using Josephson Junction Arrays.*
AD-A200 259
- *STRONTIUM COMPOUNDS
Reprint: Collisional Energy Pooling for $Sr(5\ 3P^1) + Sr(5\ 3P^1)$ Yields $Sr(8\ (3,1)S) + Sr(5\ 1S)$.
AD-A200 225
- *SUBSTRATES
Tunneling Microscopy of Superconductors and Tunneling Barriers.*
AD-A197 688
- *SULFUR
State-Specific Energy Transfer in Diatomic Radicals.*
AD-A200 357
- *SULFUR OXIDES
Reprint: Vector Correlations in the Photodissociation of CH_3I , OCS , and Glyoxal.
AD-A198 332
- *SUPERCONDUCTIVITY
Tunneling Microscopy of Superconductors and Tunneling Barriers.*
- AD-A197 686
Reprint: A New Mechanism for Superconductivity.
AD-A198 404
- *SUPERCONDUCTORS
Coupled s-Wave and d-Wave States in the Heavy Fermion Superconductor $U\ sub\ 1-x\ Th\ sub\ x\ Be\ sub\ 13$.
AD-A197 124
Tunneling Microscopy of Superconductors and Tunneling Barriers.*
AD-A197 688
Detectors of Infrared Radiation Based on High T(c) Superconducting YBCO Films.*
AD-A199 820
Superconducting Electronic Film Structures.*
AD-A200 534
Reprint: Material Constraints on Electronic Applications of Oxide Superconductors.
AD-A200 536
- *SUPERSONIC FLOW
Development and Application of Oxygen Flow Tagging for Velocity Measurements and Flow Visualization in Turbulent Three-Dimensional Supersonic Flows.*
AD-A200 119
- *SURFACE ACOUSTIC WAVES
Reprint: Lattice Vibrations in Thin-Film Carbon: Electron-Rayleigh-Wave Interaction.
AD-A198 265
- *SURFACE CHEMISTRY
Reprint: Electrochemistry at Well-Characterized Surfaces.
AD-A197 453
Proceedings of the Topical Meeting on the Microphysics of Surfaces, Beams, and Adsorbates (2nd) Held in Santa Fe, New Mexico on 16-18 February 1987.*
AD-A197 801
Diffusion at Interfaces:

SUBJECT INDEX-37
UNCLASSIFIED EVJ00F

STO-SUR

UNCLASSIFIED

Microscopic Concepts. Proceedings of a Workshop Held in Campobello Island, Canada on August 18-22 1987. Springer Series in Surface Sciences. Volume 12.*
AD-A197 759
Reprint: Collisional-Induced Absorption in Calcium Rare-Gas Collisions.
AD-A198 831
In-Situ Surface during Laser-Controlled Chemical Processing of Surfaces.*
AD-A200 206

*SURFACE TEMPERATURE
Surface Thermometry of Energetic Materials by Laser-Induced Fluorescence.*
AD-A198 084

*SWITCHES
Transport and Junction Physics of Semiconductor-Metal Eutectic Composites.*
AD-A198 480

*SYMBOLIC PROGRAMMING
Instrumentation Request for Optical Symbolic Computing.*
AD-A197 561
Symbolic Processor Based Models of Neural Networks.*
AD-A200 200
Massive Symbolic Mathematical Computations and Their Applications.*
AD-A200 253
Optics and Symbolic Computing.*
AD-A200 584

*SYMBOLS
Optical Symbolic Processor for Expert System Execution.*
AD-A197 888

*SYMPOSIA
Microstructure and Properties of Catalysts Symposium Held in Boston, Massachusetts on November 30-December 3, 1987. Materials

Research Society Symposium Proceedings. Volume 111.*
AD-A197 253

*SYNAPSE
Reprint: Cellular Mechanisms of Noradrenergic Enhancement of Long-Term Synaptic Potentiation in Hippocampus.
AD-A197 191
Synaptic Plasticity and Memory Function.*
AD-A198 473
Amine Neurotransmitter Regulation of Long-Term Synaptic Plasticity in Hippocampus.*
AD-A200 201

*SYNCHRONISM
Reprint: Simultaneous EPR (electron Paramagnetic Resonance) Electrochemical Measurements on Polyfluorene in Ambient Temperature Ionic Liquids.
AD-A198 137

*SYNTASES
Reprint: Mechanism of Chain Extension Step in Biosynthesis.
AD-A198 138

*SYNTHESIS(CHEMISTRY)
Reprint: A Dimer Ketone Formed via Fe(CO)5-Promoted Coupling of 7-Phenoxynorbornadiene to Carbon Monoxide.
AD-A197 884

*SYSTEMS ANALYSIS
Applications of Operator Theory to Maximum Entropy Problems.*
AD-A200 586

*SYSTEMS ENGINEERING
Evaluation Methodology for Software Engineering.*
AD-A198 398

*TELLURIUM
Reprint: Synthesis of Trifluorosilyl Organometallic

Complexes from Trifluorosilyl Radicals and Metal Atoms.
AD-A198 580

*TEST AND EVALUATION
High Temperature Mechanical Testing Facilities.*
AD-A200 585

*TEST EQUIPMENT
The National Diagnostic Facility under Construction.*
AD-A198 901

*THEOREMS
Reprint: On a Joint Strong Approximation Theorem for Record and Inter-Record Times.
AD-A198 370

*THERMAL ANALYSIS
Thermal Analysis System (DSC, TGA, TMA) for Oxidation and Phase Transformation Studies of Alloys with Metastable Phase.*
AD-A198 420

*THERMODYNAMICS
Reprint: Thermodynamically Reversible Uptake of Electrically Active Dopants in Conducting Polymers: Iodine in Polythiophene.
AD-A198 378

*THERMOGRAVIMETRIC ANALYSIS
Thermal Analysis System (DSC, TGA, TMA) for Oxidation and Phase Transformation Studies of Alloys with Metastable Phase.*
AD-A198 420

*THERMOMECHANICS
Thermal Analysis System (DSC, TGA, TMA) for Oxidation and Phase Transformation Studies of Alloys with Metastable Phase.*
AD-A198 420

*THERMOSPHERE
Reprint: Remeasurement of the Rate Constant and Branching Ratio

SUBJECT INDEX-38
UNCLASSIFIED EVJ00F

SUR-THE

for the $N(2)^+ + O$ Reaction.
AD-A198 389
Investigations of the Dynamics
and Thermodynamics of the
Mesosphere and Upper Thermosphere
at the Polar Regions.*
AD-A198 463
Electromechanical Feedback
Processes in the Ionosphere.*
AD-A199 235

*THERMOVISION
Non Contacting Evaluation of
Strains and Cracking Using Optical
and Infrared Imaging Techniques.*
AD-A200 397

*THIAZOLES
Reprint: Rheological and Rheo-
Optical Studies with Nematogenic
Solutions of a Rodlike Polymer: A
review of Data on Poly (Phenylene
Benzobisthiazole).
AD-A197 994
Rheological, Rheo-Optical and
Light Scattering Studies on Nematic
Solutions of Poly(1,4-Phenylene-2,6-
Benzobisthiazole).*
AD-A198 380
Reprint: Frank Elastic Constants
and Leslie-Ericksen Viscosity
Coefficients of Nematic Solutions
of a Rodlike Polymer.
AD-A198 461

*THIN FILMS
Tunneling Microscopy of
Superconductors and Tunneling
Barriers.*
AD-A197 886
Research on Sputtering of
Ferroelectric Thin Films.*
AD-A197 899
Role of Surface and Thin Film
Composition and Microstructure and
Properties of Materials.*
AD-A197 985
Reprint: Lattice Vibrations in
Thin-Film Carbon: Electron-Rayleigh-
Wave Interaction.
AD-A198 269

Reprint: Polymeric
Heterostructure Thin Films.
AD-A200 363

*THIOLS
Reprint: Characterization of
Hydroquinone and Related Compounds
Adsorbed at Pt(111) from Aqueous
Solutions: Electron Energy-Loss
Spectroscopy, Auger Spectroscopy,
Low-Energy Electron Diffraction,
and Cyclic Voltammetry.
AD-A197 715

*THIOPHENES
Reprint: Absorption of Gaseous
Iodine by Polythiophene Films and
Powders.
AD-A198 218
Reprint: Holes, Electrons,
Polarons, and Bipolarons and the
Thermodynamics of Electrically
Active Dopants in Conducting
Polymers.
AD-A198 402
Reprint: Electrochemistry of
Polythiophene and Polybithiophene
Films in Ambient Temperature Molten
Salts.
AD-A198 565

*THREE DIMENSIONAL
A 3-D Object Recognition System
Using Aspect Graphs.*
AD-A198 472

*THREE DIMENSIONAL FLOW
Management and Control of
Unsteady and Turbulent Flows.*
AD-A198 081

*TITANIUM
Investigation of Defect and
Electronic Interactions Associated
with GaAs Device Processing.*
AD-A200 541

*TOLUENES
Early Phase Interactions of
Toluene with Membranes: A
structural and Functional

Evaluation.*
AD-A200 549

*TOXICITY
Interactions Among Drinking and
Ground Water Contaminants on Renal
and Hepatic Function.*
AD-A197 075
Validation and Application of
Pharmacokinetic Models for
Interspecies Extrapolations in
Toxicity Risk Assessments of
Volatile Organics.*
AD-A200 034
The Effects of Hydrazines on
Neuronal Excitability.*
AD-A200 199
Early Phase Interactions of
Toluene with Membranes: A
structural and Functional
Evaluation.*
AD-A200 549

*TRAILING VORTICES
Investigation of Phenomena of
Discrete Wingtip Jets.*
AD-A199 962

*TRAJECTORIES
Reprint: Trajectory Studies of
Unimolecular Reactions of Si_2H_4 and
 SiH_2 on a Global Potential Surface
to Ab Initio and Experimental Data.
AD-A200 369

*TRANSFORMATIONS(MATHEMATICS)
Linear Transformations,
Projection Operators and
Generalized Inverses; A Geometric
Approach.*
AD-A197 608
Reprint: Abel Inversion Using
Transform Techniques.
AD-A199 238

*TRANSISTORS
Semiconductor Alloy Engineering
for High-Speed Devices.*
AD-A200 356

*TRANSITION METAL COMPOUNDS

UNCLASSIFIED

The Reactivity of Transition
Metal-Silicon Compounds.*
AD-A200 371

*TRANSITION METALS

Reprint: Chemistry of
Polynuclear Metal Complexes with
Bridging Carbene or Carbyne
Ligands. Part 75. Reactions of
Octacarbonyldicobalt with the Salts
(X)(W(triple bond CR)(CO)2(eta 5-
C2B9H9Me2)) (X = NEt4 or PPh4; R =
Me, Ph, C6H4Me-2, or C6H4Me-4);
Crystal Structure of (PPh4)(Co2W(mu
sub 3-CPh)(CO)8(eta 5-
C2B9H9Me2)). 0.5CH2Cl2.
AD-A200 065

*TRANSONIC FLOW

Coupling Linearized Far-Field
Boundary Conditions with Nonlinear
Near-Field Solutions in Transonic
Flow.*
AD-A198 721

*TRANSPORT PROPERTIES

Experimental Study of Plasmoid
Formation and Transport by Means of
Moving Magnetic Fields.*
AD-A200 005

*TRAVELING WAVES

Investigation of Acceleration
and Densification of Electrons
Utilizing Travelling Magnetic
Waves.*
AD-A197 700

*TROPICAL REGIONS

Topical Meeting on Optics in
Adverse Environments: Summaries of
Papers Presented at the Optics in
Adverse Environments Topical
Meeting Held in Albuquerque, New
Mexico on 11-12 February 1987.
Technical Digest Series. Volume 8.*
AD-A197 119

*TUNABLE LASERS

Tunable Solid State Lasers and
Synthetic Nonlinear Materials.*

AD-A198 992

*TUNGSTEN

Photochemical Disproportionation
Reactions of the W2(CO)10(2-) and
Fe2(CO)8(2-) Complexes.*
AD-A197 900

Reprint: Chemistry of
Polynuclear Metal Complexes with
Bridging Carbene or Carbyne
Ligands. Part 75. Reactions of
Octacarbonyldicobalt with the Salts
(X)(W(triple bond CR)(CO)2(eta 5-
C2B9H9Me2)) (X = NEt4 or PPh4; R =
Me, Ph, C6H4Me-2, or C6H4Me-4);
Crystal Structure of (PPh4)(Co2W(mu
sub 3-CPh)(CO)8(eta 5-
C2B9H9Me2)). 0.5CH2Cl2.
AD-A200 065

*TUNNELING

Reprint: Diffusion of H Atoms on
a Si(111) Surface with Partial
Hydrogen Coverage: Monte Carlo
Variational Phase-Space Theory with
Tunneling Correction.
AD-A198 328
Reprint: Laser Fluorescence
Excitation Spectrum of Jet-Cooled
Tropolone: The A(1) B sub 2 - X(1)
A sub 1 System.
AD-A198 730

Semiconductor Alloy Engineering
for High-Speed Devices.*
AD-A200 358

*TUNNELING(ELECTRONICS)

Studying Quantum Phase-Based
Electronic Devices.*
AD-A200 376
Superconducting Electronic Film
Structures.*
AD-A200 534
Reprint: Material Constraints on
Electronic Applications of Oxide
Superconductors.
AD-A200 536

*TURBINE BLADES

Interface Stability between Two
Gas Streams of Different Density in

a Curved Flow.*
AD-A188 874

*TURBINE STATORS

The Measurement and Prediction
of Rotordynamic Forces for
Labyrinth Seals.*
AD-A187 185

*TURBINES

Interface Stability between Two
Gas Streams of Different Density in
a Curved Flow.*
AD-A189 874

*TURBULENCE

Parallel Algorithms in the
Finite Element Approximation of
Flow Problems.*
AD-A187 454

Reprint: An Examination of
Forcing in Direct Numerical
Simulations of Turbulence.
AD-A198 276

Long Term Studies of the
Refractive Index Structure
Parameter in the Troposphere and
Stratosphere.*

AD-A198 313
Studies of Internal Wave/Mean
Flow Interactions.*
AD-A188 949

Carbon Monoxide and Turbulence-
Chemistry Interactions: Blowoff and
Extinction of Turbulent Jet
Diffusion Flames.*
AD-A199 961

*TURBULENT DIFFUSION

Reprint: The Evolution of
Surfaces in Turbulence.
AD-A188 366

*TURBULENT FLOW

Management and Control of
Unsteady and Turbulent Flows.*
AD-A188 081
Reprint: The Evolution of
Surfaces in Turbulence.
AD-A198 368

Interface Stability between Two

SUBJECT INDEX-40
UNCLASSIFIED EVJ00F

TRA-TUR

Gas Streams of Different Density in
a Curved Flow.*
AD-A199 874

*TYROSINE

Reprint: Studies of L-DOPA and
Related Compounds Adsorbed from
Aqueous Solutions at Pt(100) and
Pt(111): Electron Energy-Loss
Spectroscopy, Auger Spectroscopy,
and Electrochemistry.
AD-A198 501

*ULTRASONIC RADIATION

Research on the Statistics of
Grain Lattice Echoes and Their Use
in Grain Size Estimation and Grain
Echo Suppression.*
AD-A199 811

*ULTRAVIOLET LASERS

Reprint: Digital Imaging of
Laser-Ignited Combustion.
AD-A200 329

*UNSTEADY FLOW

Management and Control of
Unsteady and Turbulent Flows.*
AD-A198 081
Management and Control of
Separation by Unsteady and Vortical
Flows.*

AD-A198 902

Studies of Unsteadiness in
Boundary Layers.*

AD-A199 989

Unsteady Separated Flows:
Structures and Processes.*

AD-A200 232

Unsteady Viscous Flows Over
Moving Body.*

AD-A200 289

*URBAN AREAS

Reprint: Urban Climate Effects
of Energy Demand for Space Heating.
AD-A200 333

*VACUUM CHAMBERS

The University of New Hampshire
Vacuum Chamber and Charged Particle

Calibration Source.*

AD-A199 623

*VACUUM SWITCHES

Mega-Amp Opening Switch with
Nested Electrodes/Pulsed Generator
of Ion and Ion Cluster Beams.*
AD-A198 465

*VANADIUM

Investigation of Defect and
Electronic Interactions Associated
with GaAs Device Processing.*
AD-A200 541

*VAPOR PHASES

Reprint: Holes, Electrons,
Polarons, and Bipolarons and the
Thermodynamics of Electrically
Active Dopants in Conducting
Polymers.
AD-A198 402

Reprint: Electronic States of
the Xe(n)HCl Systems in Gas and
Condensed Phases.
AD-A199 792

Reprint: Mechanism of the
Thermal Decomposition of
Dimethylsilane at Atmospheric
Pressures in the Gas Phase.
AD-A200 197

*VARIATIONS

Variance Function Estimation in
Regression: The Effect of
Estimating the Mean.*
AD-A198 228

*VECTOR SPACES

Linear Transformations,
Projection Operators and
Generalized Inverses: A Geometric
Approach.*
AD-A197 608

*VIBRATIONAL SPECTRA

Reprint: Basis Set Effects and
the Choice of Reference Geometry in
Ab Initio Calculations of
Vibrational Spectra.
AD-A199 238

*VIDEO RECORDING

Iron Contacting Evaluation of
Strains and Cracking Using Optical
and Infrared Imaging Techniques.*
AD-A200 387

*VINYL PLASTICS

Reprint: High Resolution
Spectroscopic Studies of Small
Molecules.
AD-A199 837

*VISCIOUS FLOW

Parallel Algorithms in the
Finite Element Approximation of
Flow Problems.*
AD-A197 454
Spray Formation: Three-
Dimensional Liquid Break-Up due to
Surface Tension.*
AD-A200 247
Unsteady Viscous Flows Over
Moving Body.*
AD-A200 289

*VISION

Role of Retinocortical
Processing in Spatial Vision.*
AD-A200 198

*VISUAL ACUITY

Higher Order Mechanisms of Color
Vision.*
AD-A198 093

*VISUAL AIDS

Preattentive and Attentive
Visual Information Processing.*
AD-A197 670

*VISUAL CORTEX

New Insights on Visual Cortex.
Abstracts. Center for Visual
Science Symposium (16th) Held in
Rochester, New York on June 16-18,
1986.*
AD-A199 828
Role of Retinocortical
Processing in Spatial Vision.*
AD-A200 198

SUBJECT INDEX-41
UNCLASSIFIED EVJ00F

TYR-VIS

UNCLASSIFIED

*VISUAL PERCEPTION
Conference on the
Neurophysiological Foundations of
Visual Perception.*
AD-A198 407
Visual Sensitivities and
Discriminations and Their Roles in
Aviation.*
AD-A198 470
New Insights on Visual Cortex.
Abstracts. Center for Visual
Science Symposium (16th) Held in
Rochester, New York on June 16-18,
1988.*
AD-A199 826
*VORTICES
Management and Control of
Separation by Unsteady and Vortical
Flows.*
AD-A198 902
*WAKE
Investigation of Phenomena of
Discrete Wingtip Jets.*
AD-A199 962
*WATER ANALYSIS
Reprint: Aspects of the
Chemistry of Water in Ambient-
Temperature Chloraluminate Ionic
Liquids: 170 NMR Studies.
AD-A198 225
*WATER POLLUTION
Interactions Among Drinking and
Ground Water Contaminants on Renal
and Hepatic Function.*
AD-A197 075
*WEIGHTING FUNCTIONS
An Asymptotic Theory for
Weighted Least Squares with Weights
Estimated by Replication.*
AD-A198 000
Weighted and Clouded
Distributions.*
AD-A198 321
*WHITE NOISE
Reprint: Robust, Reduced-Order.

Nonstrictly Proper State Estimation
via the Optimal Projection
Equations with Guaranteed Costs
Bounds.
AD-A198 397
*WIND TUNNELS
Equipment to Upgrade the
Facilities of the IIT (Illinois
Institute of Technology) Fluid
Dynamics Research Center.*
AD-A198 084
*WING TIPS
Investigation of Phenomena of
Discrete Wingtip Jets.*
AD-A199 962
*WINGS
Coupling Linearized Far-Field
Boundary Conditions with Nonlinear
Near-Field Solutions in Transonic
Flow.*
AD-A198 721
*X RAYS
Opening Switch Research on a
Plasma Focus VI.*
AD-A198 155
*XENON
Reprint: Electronic States of
the Xe(n)HCl Systems in Gas and
Condensed Phases.
AD-A199 792
*YAG LASERS
Reprint: Pump/Probe Method for
Fast Analysis of Visible Spectral
Signatures Utilizing Asynchronous
Optical Sampling.
AD-A198 318
Intense XUV Radiation Sources.*
AD-A200 292
*YTTRIUM ALUMINUM GARNET
Mechanistic Studies of Pressure-
Assisted Superplasticity of
Structural Ceramics.*
AD-A200 202

*ZINC COMPOUNDS
MBE Growth, Characterization and
Electronic Device Processing of
HgCdTe, HgZnTe, Related
Heterojunctions and HgCdTe-CdTe
Superlattices.*
AD-A198 421
*ZIRCONIUM OXIDES
Mechanistic Studies of Pressure-
Assisted Superplasticity of
Structural Ceramics.*
AD-A200 202

SUBJECT INDEX-42
UNCLASSIFIED EVJ00F

VIS-ZIR

PERSONAL AUTHOR INDEX

PERSONAL AUTHOR INDEX

- *ABRAMS, LLOYD * * *
Size, Shape and Site Selectivities
in the Photochemical Reactions of
Molecules Adsorbed on Pentasil
Zeolites,
AD-A197 758
- *ACHARYA, MUKUNDE * * *
Equipment to Upgrade the Facilities
of the IIT (Illinois Institute of
Technology) Fluid Dynamics Research
Center.
AD-A198 084
- *ACHARYA, MUKUND * * *
Management and Control of Unsteady
and Turbulent Flows.
AD-A198 091
- * * *
Management and Control of
Separation by Unsteady and Vortical
Flows.
AD-A198 802
- *ADLER, ROBERT J * * *
Tail Behaviour for the Supremacy of
Gaussian Processes with
Applications to Empirical
Processes.
AD-A200 511
- *ADOMIAN, GEORGE * * *
A New Approach to the Analysis and
Control of Large Space Structures.
Phase 1.
AD-A198 143
- *AGRAWAL, PARAS M * * *
Computational Studies of SiH₂+SiH₂
Recombination Reaction Dynamics on
a Global Potential Surface Fitted
to Ab Initio and Experimental Data.
AD-A198 377
- * * *
Trajectory Studies of Unimolecular
Reactions of SiH₂H₄ and SiH₂ on a
Global Potential Surface Fitted to
Ab Initio and Experimental Data.
AD-A200 389
- *ALEXANDER, M. H * * *
A Nomenclature for Lambda-Doublet
Levels in Rotating Linear
Molecules,
AD-A199 838
- *ALEXANDER, MILLARD H * * *
Energetics and Spin- and Lambda-
Doublet Selectivity in the Infrared
Multiphoton Dissociation HN₃(X 1A)
Yields N₂(X 1 Sigma sub g(+)) +
NH(X 3 Sigma(-), A 1 Delta):
Theory,
AD-A199 828
- *ALLENDERFER, R. D * * *
Simultaneous EPR (Electron
Paramagnetic Resonance)
Electrochemical Measurements on
Polyfluorene in Ambient Temperature
Ionic Liquids.
AD-A198 137
- * * *
Simultaneous EPR (Electron
Paramagnetic Resonance)
Electrochemical Measurements on
Polypyrrole in Ambient Temperature
Ionic Liquids,
AD-A198 323
- *ALVEY, M. D * * *
DIET in the Second Layer: An ESDIAD
(Electron Stimulated Desorption Ion
Angular Distribution) Study of NH₃
on a CO Layer on Ni(111) and
Ni(110).
AD-A197 870
- * * *
Observation of Molecular Rotors on
Surfaces by ESDIAD (Electron
Stimulated Desorption Ion Angular
Distribution): Studies of PF₃ and
- NH₃ Chemisorption on Ni Surfaces,
AD-A198 505
- *ANDRESEN, P * * *
A Nomenclature for Lambda-Doublet
Levels in Rotating Linear
Molecules,
AD-A199 838
- *ANTOLOVICH, STEPHEN D. * * *
Cyclic Deformation, Damage, and
Effects of Environment in the Ni3Al
Ordered Alloy at Elevated
Temperatures.
AD-A198 500
- *ANTON, D. L * * *
Dispersion Strengthening of High
Temperature Niobium Alloys.
AD-A198 958
- *APPLING, J. R * * *
Circular Dichroism in Photoelectron
Angular Distributions from Two-
Color (1+1) REMPI (Resonantly
Enhanced Multiphoton Ionization) of
NO.
AD-A198 367
- *ARAPOSTATHIS, ARISTOTLE * * *
A Model Reference Adaptive Control
Scheme for Pure-Feedback Nonlinear
Systems.
AD-A198 386
- *ARAPOSTATHIS, ARISTOTLE * * *
Affine-Feedback Stabilization of
Piecewise-Linear Hypersurface
Systems.
AD-A198 317
- * * *
Remarks on Smooth Feedback
Stabilization of Nonlinear Systems.
AD-A198 385

*ARAPOSTATHIS, ARISTOTLE * * *

Remarks on Discretization and
Linear Equivalence of Continuous
Time Nonlinear Systems.
AD-A198 388

*ARNEY, BENNY E., JR * * *

Reductive Amination of
Pentacyclo(5.4.0.0(2.8).0(3.10).0(5.
9))undecane-8,11-dione,
AD-A198 222

*ARNEY, BENNY E., JR * * *

Transannular Cyclizations in the
Pentacyclo(5.4.0.0(2.8).0(3.10).0(5.
9))undecane-8,11-dione System: A
reinvestigation.
AD-A198 028

*ARNOLDUS, HENK F * * *

Memory-Induced Extra Resonances of
Adsorbates.
AD-A198 211

* * *

Line Shape of an Atom-Crystal Bond.
AD-A200 382

*ARNOLDY, ROGER L. * * *

The University of New Hampshire
Vacuum Chamber and Charged Particle
Calibration Source.
AD-A199 823

*ATHALE, * * *

Optics and Symbolic Computing.
AD-A200 564

*BACIS, R * * *

A Nomenclature for Lambda-Doublet
Levels in Rotating Linear
Molecules.
AD-A199 838

*BAHNS, J. T

* * *

Electronic Assignments of the
Violet Bands of Sodium.
AD-A199 839

*BAIN, LEE J * * *

Test of Equal Gamma-Distribution
Means with Unknown and Unequal
Shape Parameters.
AD-A200 388

*BAIN, LEE J. * * *

A Confidence Interval for Treatment
Component-of-Variance with
Applications to Differences in
Means of Two Exponential
Distributions.
AD-A200 540

*BALDRIDGE, KIM K * * *

Potentially Aromatic Metallocycles.
AD-A197 785

*BANSAL, RAKESH K. * * *

Robust Algorithms for Detecting a
Change in a Stochastic Process with
Infinite Memory.
AD-A198 290

*BARDOUCH, EYTAN * * *

Collective Properties of Neural
Systems and Their Relation to Other
Physical Models.
AD-A199 988

*BASU, P * * *

Fragmentation of Molecular
Adsorbates by Electron and Ion
Bombardment: Methoxy Chemistry on
Al(111).
AD-A199 728

*BATINA, NIKOLAE * * *

Studies of L-DOPA and Related

Compounds Adsorbed from Aqueous
Solutions at Pt(100) and Pt(111):
Electron Energy-Loss Spectroscopy,
Auger Spectroscopy, and
Electrochemistry.
AD-A198 501

*BATTAGLIA, FRANCO * * *

Anomalies in the Heat-Capacity
Signatures of Submonolayer
Adsorbates with Attractive Lateral
Interactions.
AD-A198 382

*BAUMANN, FRANZ-ERICH * * *

Chemistry of Polynuclear Metal
Complexes with Bridging Carbene or
Carbyne Ligands. Part 75. Reactions
of Octacarbonyldicobalt with the
Salts (X)(W(triple bond
CR))(CO)2(eta 5-C2B9H9Me2)) (X =
NEt4 or PPh4; R = Me, Ph. C6H4Me-
or C6H4Me-4); Crystal Structure of
(PPh4)(Co2W(mu sub 3-CPh)(CO)8(eta
5-C2B9H9Me2)). O.5CH2Cl2.
AD-A200 085

* * *

Chemistry of Polynuclear Metal
Complexes with Bridging Carbene or
Carbyne Ligands. Part 74. Salts of
the Anions (W(triple bond CR))(CO)2
(Eta(5)-C2B9H9Me2))-(R=C6H4Me-2
C6H3Me2-2,6) as Reagents for the
Synthesis of Compounds with
Heteronuclear Metal-Metal Bonds:
Crystal Structure of (N(Et)4)-
(FeW(mu-C6H3Me2-2,6)(CO)5(Eta(5)-
C2B9H9Me2)).
AD-A200 218

*BECKER, ROGER J. * * *

Laser Measurements of Transient
High-Strength Electric Fields.
AD-A198 247

*BEDAIR, S. M. * * *

Defect Reduction in Epitaxial

PERSONAL AUTHOR INDEX-2
UNCLASSIFIED EVJ00F

ARA-BED

Growth Using Superlattice Buffer Layers.
AD-A198 409

*BELBRUND, JOSEPH J

* * *
Competition among Collisional Deactivation, Ionization, and Dissociation in the Multiphoton Excitation of Octafluorocyclooctatetraene.
AD-A200 506

*BERGI, DIANA J

* * *
Organic and Polymeric Nonlinear Optical Materials; a Topical Workshop Held in Virginia Beach, Virginia on May 16-19, 1988.
AD-A198 305

*BERNASEK, S. L.

* * *
Summary Abstract: The Adsorption and Decomposition of Molybdenum Hexacarbonyl on Mo and Si Surfaces.
AD-A200 358

*BERNASEK, STEVEN L

* * *
UHV Transport System for Laser Irradiation Studies.
AD-A200 330

*BERNDT, WILLIAM D

* * *
Interactions Among Drinking and Ground Water Contaminants on Renal and Hepatic Function.
AD-A197 075

*BERNSTEIN, DENNIS S

* * *
The Optimal Projection Equations with Petersen-Holiot Bounds: Robust Stability and Performance via Fixed-Order Dynamic Compensation for Systems with Structured Real-Valued Parameter Uncertainty.
AD-A198 398

*BERNSTEIN, DENNIS S.

* * *
Inequalities for the Trace of Matrix Exponentials.
AD-A198 374

*BERNSTEIN, DENNIS S.

* * *
Unified Optimal Projection Equations for Simultaneous Reduced-Order, Robust Modelling, Estimation and Control.
AD-A198 381

* * *

Robust, Reduced-Order, Nonstrictly Proper State Estimation via the Optimal Projection Equations with Guaranteed Cost Bounds.
AD-A198 397

*BERNSTEIN, I. M

* * *
Fundamentals of Interfacial Strength in Composite Materials.
AD-A198 628

*BERRY, G.

* * *
Rheological Studies on Blends of Rodlike and Flexible Chain Polymers.
AD-A198 455

*BERRY, G. C

* * *
Rheological and Rheo-Optical Studies with Nematogenic Solutions of a Rodlike Polymer: A Review of Data on Poly (Phenylene Benzobisthiazole).
AD-A197 994

* * *

Nematic Solutions of Rodlike Polymers Light Scattering from Nematic Solutions with Complex Texture and Phase Separation in Poor Solvents.
AD-A198 454

* * *

Frank Elastic Constants and Leslie-Ericksen Viscosity Coefficients of

Nematic Solutions of a Rodlike Polymer.
AD-A198 481

*BERRY, GUY C

* * *
Rheological, Rheo-Optical and Light Scattering Studies on Nematic Solutions of Poly(1,4-Phenylene-2,6-Benzobisthiazole).
AD-A198 380

*BERSOHV, R

* * *
Time Dependent Absorption of Fragments During Dissociation.
AD-A198 329
* * *
A Nomenclature for Lambda-Doublet Levels in Rotating Linear Molecules.
AD-A198 838

*BHATTI, AMJAD W

* * *
Synthesis of Side Chain Liquid Crystal Polymers for Nonlinear Optics.
AD-A200 368

* * *

Pyridine N-Oxides as Polymeric Nonlinear Optical Materials.
AD-A200 367

*BIEGAUSKI, J. E

* * *
Monolayer and Langmuir-Blodgett Multilayer Surface and Spectral Studies of Poly-3-BCMU.
AD-A198 801

*BIERBAUM, VERONICA W

* * *
Remeasurement of the Rate Constant and Branching Ratio for the N(2)+ O Reaction.
AD-A198 388

*BIERSCHENK, THOMAS R

* * *
Synthesis of Trifluorosilyl

PERSONAL AUTHOR INDEX-3
UNCLASSIFIED EVJ00F

BEL-BYE

UNCLASSIFIED

Organometallic Complexes from
Trifluorosilyl Radicals and Metal
Atoms.
AD-A198 580

*BIRKAN, M.A * * *

Asymptotic Structure and Extinction
of Diffusion Flames with Chain
Mechanism.
AD-A200 332

*BISCHEL, WILLIAM K * * *

Two-Photon-Excited Fluorescence
Spectroscopy of Atomic Fluorine at
170 nm.
AD-A198 240

*BISCHEL, WILLIAM K. e e e e e
* * *

Two Photon Detection Techniques for
Atomic Fluorine.
AD-A199 955

*BIWER, BRUCE M * * *

UHV Transport System for Laser
Irradiation Studies.
AD-A200 330

*BLACKWELDER, RON F * * *

Studies of Unsteadiness in Boundary
Layers.
AD-A199 989

*BLUM, BRUCE I. e e e e
* * *

Evaluation Methodology for Software
Engineering.
AD-A198 398

*BOATZ, JERRY A * * *

Theoretical Studies of
Silabicyclobutanes and
Silacyclobutenes, $CnSi(4-n)H_8$ ($n =$
0-4).
AD-A197 953

*BOEHMAN, L. I. e e e e e
* * *

Interface Stability between Two Gas
Streams of Different Density in a
Curved Flow.
AD-A199 874

*BONCZYK, PAUL A. e e
* * *

Investigation of Fuel Additive
Effects on Sooting Flames.
AD-A200 273

*BOUDJOUK, PHILIP e e e e e
* * *

Purchase of a Nuclear Magnetic
Resonance Spectrometer.
AD-A197 610

* * *

A Convenient Synthesis of Alkali
Metal Selenides and Diselenides in
Tetrahydrofuran and the Reactivity
Differences Exhibited by These
Salts toward Organic Bromides.
Effect of Ultrasound.
AD-A197 869

*BOURGUIGNON, BERNARD * * *

Desorption of a Two-State System:
Laser Probing of Gallium Atom Spin-
Orbit States from Silicon (100).
AD-A199 239

*BOWYER, KEVIN * * *

A 3-D Object Recognition System
Using Aspect Graphs.
AD-A198 472

*BRAGINSKI, A. I * * *

Superconducting Electronic Film
Structures.
AD-A200 534

*BRAGINSKI, A. I. e e e
* * *

Material Constraints on Electronic
Applications of Oxide
Superconductors.

AD-A200 538

*BREVAL, ELSE * * *

Microstructure, Porosity and
Mechanical Property Relationships
of Calcium-Silicate-Hydrate.
AD-A200 120

*BRIDGES, THOMAS J * * *

Minimizing the Reflection of Waves
by Surface Impedance Using Boundary
Elements and Global Optimization.
AD-A200 337

*BRIGOLA, R * * *

On Functional Estimates for Ill-
Posed Linear Problems.
AD-A198 004

*BRISTOW, JULIAN * * *

Optical Symbolic Processor for
Expert System Execution.
AD-A197 888

*BROADWELL, JAMES E. e e e
* * *

Investigations of the Motion of
Discrete-Velocity Gases by Cellular
Automata.
AD-A200 221

*BROWN, MARK e e e
* * *

On a Correlation Inequality and Its
Applications.
AD-A198 295

*BRUCKNER, JAMES V * * *

Validation and Application of
Pharmacokinetic Models for
Interspecies Extrapolations in
Toxicity Risk Assessments of
Volatile Organics.
AD-A200 034

*BUCKLEW, JAMES A

PERSONAL AUTHOR INDEX-4
UNCLASSIFIED EVJ00F

BIR-8UC

- * * *
- Estimating Random Integrals from Noisy Observations: Sampling Designs and Their Performance. AD-A197 771
- *BURNETT, K.E * * *
- Modifying Excitation Transfer Cross Sections with an ac Stark Effect. AD-A197 998
- *BYER, ROBERT L. * * *
- Tunable Solid State Lasers and Synthetic Nonlinear Materials. AD-A198 982
- *CADENHEAD, D. A * * *
- Monolayer and Langmuir-Blodgett Multilayer Surface and Spectral Studies of Poly-3-BCMU. AD-A198 601
- *CADZOW, JAMES A. * * *
- Continuity of Closest Rank-p Approximations to Matrices. AD-A200 213
- *CAMBANIS, STAMATIS * * *
- Estimating Random Integrals from Noisy Observations: Sampling Designs and Their Performance. AD-A197 771
- *CAMPBELL, STEPHEN L. * * *
- A Computational Method for General Higher Index Nonlinear Singular Systems of Differential Equations. AD-A199 237
- *CAMPION, ALAN * * *
- In-Situ Surface during Laser-Controlled Chemical Processing of Surfaces. AD-A200 206
- *CARL, RICHARD T * * *
- Competition among Collisional Deactivation, Ionization, and Dissociation in the Multiphoton Excitation of Octafluorocyclooctatetraene. AD-A200 508
- *CARLETON, KAREN L. * * *
- Desorption of a Two-State System: Laser Probing of Gallium Atom Spin-Orbit States from Silicon (100). AD-A199 238
- *CARLIN, RICHARD T * * *
- Removal of Protons from Ambient-Temperature Chloroaluminate Ionic Liquids. AD-A198 451
- * * *
- Electrochemistry of Molybdenum Chloride Dimers in a Basic Ambient-Temperature Molten Salt. AD-A198 582
- *CARR, STEPHEN H. * * *
- PBT PBQ-Based Hyorid Polymers with Nonlinear Optical Properties or High Electrical Conductivity. AD-A200 228
- *CARRION, PHILIP M * * *
- Alfven Waves in a Cold Plasma with Curved Magnetic Fields. AD-A200 312
- *CARROLL, JAMES V. * * *
- Algorithms for Robust Identification and Control of Large Space Structures. Phase 1. AD-A198 130
- *CARROLL, R. J * * *
- A Quick and Easy Multiple Use
- Calibration Curve Procedure. AD-A188 227 * * *
- Nonparametric Estimation of Optimal Performance Criteria in Quality Engineering. AD-A188 315 * * *
- Variance Functions and the Minimum Detectable Concentration in Assays. AD-A200 203
- *CARROLL, R. J. * * *
- Variance Function Estimation in Regression: The Effect of Estimating the Mean. AD-A188 228
- *CARROLL, R. J. * * *
- A Note on Extended Quasi-Likelihood. AD-A198 042 * * *
- Variance Function Estimation. AD-A199 822
- *CARROLL, RAYMOND J * * *
- Optimal Rates of Convergence for Deconvolving a Density. AD-A197 748 * * *
- An Asymptotic Theory for Weighted Least Squares with Weights Estimated by Replication. AD-A198 000 * * *
- A Note on Second Order Effects in a Semiparametric Context. AD-A198 018 * * *
- Conditional Scores and Optimal Scores for Generalized Linear Measurement-Error Models. AD-A198 379 * * *
- Discussion of Box's 1987 Article in Technometrics. AD-A199 823

UNCLASSIFIED

* * *
A Note on Computing Robust Regression Estimates via Iteratively Reweighted Least Squares.
AD-A200 161

*CARROLL, RAYMOND J. e e e e e
* * *
Covariance Analysis in Generalized Linear Measurement Error Models.
AD-A197 861

* * *
The Effects of Variance Function Estimation on Prediction and Calibration. An Example.
AD-A199 821

*CARSKY, P
* * *
Basis Set Effects and the Choice of Reference Geometry in Ab Initio Calculations of Vibrational Spectra.
AD-A198 238

*CASTELLANI, MICHAEL P
* * *
Photochemistry of Organometallic Halide Complexes. Mechanisms for the Formation of Ionic Products.
AD-A198 488

*CATHEY, W. T
* * *
Instrumentation Request for Optical Symbolic Computing.
AD-A197 561

*CHAN, T. H
* * *
Anionic Ring-Opening Polymerization of Sila- and Germacyclopent-3-enes.
AD-A197 874

*CHANG, CHING S. e e e
* * *
Deformation Behavior of Sands under Cyclic Loading - A Micro-Structural Approach.
AD-A199 999

*CHAO, B. H
* * *
Theory of Nonadiabatic Flame Propagation in Dissociation Equilibrium.
AD-A198 019

*CHARLIE, WAYNE A. e
* * *
Blast Induced Liquefaction of Soils: Laboratory and Field Tests.
AD-A199 995

*CHAWLA, G. K. e
* * *
Vector Correlations in the Photodissociation of CH3I, OCS, and Glyoxal.
AD-A198 332

*CHAWLA, G. W
* * *
State-Selective Studies of T Yields R. V Energy Transfer: The H + CO system.
AD-A198 373

*CHELLAPPA, R. e
* * *
Research Instrumentation for Computer Vision, Image Understanding and Optical Computing.
AD-A198 578

*CHEN, A.-B
* * *
Semiconductor Alloy Engineering for High-Speed Devices.
AD-A200 356

*CHEN, GOONG e e
* * *
Diagonal Convexity Conditions for Problems in Convex Analysis and Quasi-Variational Inequalities.
AD-A200 547

*CHEN, GOODING
* * *
Minimizing the Reflection of Waves

by Surface Impedance Using Boundary Elements and Global Optimization.
AD-A200 337

*CHEN, H. H
* * *
Connectionist Models for Intelligent Computation.
AD-A200 445

*CHEN, I-WEI e
* * *
Mechanistic Studies of Pressure-Assisted Superplasticity of Structural Ceramics.
AD-A200 202

*CHEN, J. G
* * *
Fragmentation of Molecular Adsorbates by Electron and Ion Bombardment: Methoxy Chemistry on Al(111).
AD-A199 728

*CHEN, K. W
* * *
Investigation of Acceleration and Densification of Electrons Utilizing Travelling Magnetic Waves.
AD-A197 700

*CHEN, MAU H
* * *
Effects of Autolionizing Resonances on Electron-Impact Excitation Rates for Be-Like Ions.
AD-A199 407

*CHEN, YONGQIN
* * *
Laser Fluorescence Excitation Spectrum of Jet-Cooled Tropolone: The A(1) B sub 2 - X(1) A sub 1 System.
AD-A199 730

*CHENERA, BALANE e e e e e
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Structure of a Bis(eta4-exocyclic-

PERSONAL AUTHOR INDEX-6
UNCLASSIFIED EVJ00F

CAR-CHE

1,3-diene)Fe(CO)₃ Complex,
AD-A198 319

*CHENG, JUNG-TUNG * * *

Electrophysiological Actions of
Norepinephrine in Rat Lateral
Hypothalamus. I. Norepinephrine
Induced Modulation of LH Neuronal
Responsiveness to Afferent Synaptic
Inputs and Putative
Neurotransmitters.
AD-A198 189

*CHENG, R. K. eeeee * * *

Structure and Propagation of
Turbulent Premixed Flames
Stabilized in a Stagnation Flow,
AD-A198 452

*CHILDS, D. W. * * *

The Measurement and Prediction of
Rotordynamic Forces for Labyrinth
Seals.
AD-A197 185

*CHILDS, ROBERT E. e * * *

Spray Formation: Three-Dimensional
Liquid Break-Up due to Surface
Tension.
AD-A200 247

*CHO, C.-C. * * *

Summary Abstract: The Adsorption
and Decomposition of Molybdenum
Hexacarbonyl on Mo and Si Surfaces,
AD-A200 358

*CHO, C.-H. e * * *

Photochemistry of Benzocyclobutene,
AD-A198 507

*CHO, H. * * *

On Adaptive Control of Stochastic
Bilinear Systems,

AD-A198 074

*CHO, HANGJU * * *

Adaptive Control of Stochastic
Bilinear Systems,
AD-A198 387

*CHO, P. * * *

Structure and Propagation of
Turbulent Premixed Flames
Stabilized in a Stagnation Flow,
AD-A198 452

*CHOHAN, HARPAL S. * * *

Motion and Stability of Saturated
Soil Systems Under Dynamic Loading.
AD-A200 293

*CHORGHAE, G. S. e * * *

Dialkylaminophosphorus Metal
Carbonyls. 7. Trinuclear Iron
Carbonyl Derivatives from Reactions
of Disodium Octacarbonyldiferrate
with (Dialkylamino)dichlorophosphine
S.
AD-A200 195

*CHOU, S. H. * * *

Intermolecular Interactions and
Crystal Stabilities of
Tetrathiafulvalene-
tetracyanoquinodimethane,
AD-A200 381

*CHOW, C. Y. ee * * *

Unsteady Separated Flows:
Structures and Processes.
AD-A200 222

*CHU, SIN-KWONG * * *

Approximate Evaluation of
Reliability and Availability Via
Perturbation Analysis.
AD-A198 940

*CHUAN, T. J. * * *

Proceedings of the Topical Meeting
on the Microphysics of Surfaces,
Beams, and Adsorbates (2nd) Held in
Santa Fe, New Mexico on 18-18
February 1987.
AD-A197 801

*CHUDNOVSKY, DAVID V. * * *

Massive Symbolic Mathematical
Computations and Their
Applications.
AD-A200 253

*CHUDNOVSKY, GREGORY V. * * *

Massive Symbolic Mathematical
Computations and Their
Applications.
AD-A200 253

*CHUNG, S. H. * * *

Extinction of Interacting Premixed
Flames: Theory and Experimental
Comparisons,
AD-A198 275

*CINLAR, E. * * *

Reliability of Complex Devices in
Random Environments,
AD-A183 558

*CINLAR, ERHAN * * *

Sunset over Brownistan,
AD-A198 443

*CINLAR, ERHAN * * *

On Lifetimes Influenced by a Common
Environment.
AD-A198 273

*CLINE, DAREN B. * * *

An Asymptotic Theory for Weighted
Least Squares with Weights

PERSONAL AUTHOR INDEX-7
UNCLASSIFIED EVJ00F

CHE-CLY

UNCLASSIFIED

Estimated by Replication.
AD-A198 000

*COLAIANNI, M. L. * * *

Fragmentation of Molecular
Adsorbates by Electron and Ion
Bombardment: Methoxy Chemistry on
Al(111).
AD-A198 728

*COLTON, DAVID * * *

Far Field Patterns and the Inverse
Scattering Problem for
Electromagnetic Waves in an
Inhomogeneous Medium,
AD-A200 223

* * *

The Inverse Scattering Problem for
Time-Harmonic Acoustic Waves in an
Inhomogeneous Medium,
AD-A200 335

*COMES, F. J. eeee

* * *

A Nomenclature for Lambda-Doublet
Levels in Rotating Linear
Molecules,
AD-A198 838

*COOK, MARK K. eeeee

* * *

Adaptive Hybrid Picture Coding.
AD-A200 059

*COOPER, BERNARD R. * * *

High Temperature Properties of
Ceramic/Carbon Systems in an
Oxidizing Environment.
AD-A200 254

*COOPER, J. * * *

Modifying Excitation Transfer Cross
Sections with an ac Stark Effect,
AD-A197 998

*COOPER, J. eeeee * * *

Collisional-Induced Absorption in
Calcium Rare-Gas Collisions,
AD-A198 831

*COOPER, JAMES A., JRE

* * *

Investigation of a New Concept in
Semiconductor Microwave
Oscillators.
AD-A198 039

*COPELAND, RICHARD A. * * *

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State-Specific Energy Transfer in
Diatomic Radicals.
AD-A200 357

*CORBIN, DAVID R. * * *

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Size, Shape and Site Selectivities
in the Photochemical Reactions of
Molecules Adsorbed on Pentasil
Zeolites.
AD-A197 758

*CORKE, THOMAS * * *

* * *

Equipment to Upgrade the Facilities
of the IIT (Illinois Institute of
Technology) Fluid Dynamics Research
Center.
AD-A198 084

* * *

The National Diagnostic Facility
under Construction.
AD-A198 901

*CORKE, THOMAS C. * * *

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Management and Control of Unsteady
and Turbulent Flows.
AD-A198 081

*CORREA, S. M. eeeee

* * *

Carbon Monoxide and Turbulence-
Chemistry Interactions: Blowoff and
Extinction of Turbulent Jet
Diffusion Flames.
AD-A199 961

*COUTY'S, J. * * *

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Modifying Excitation Transfer Cross
Sections with an ac Stark Effect,
AD-A197 998

* * *

Collisional-Induced Absorption in
Calcium Rare-Gas Collisions,
AD-A198 831

*COX, B. N. * * *

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Integration of Statistical and
Physical Models of Short Fatigue
Crack Growth.
AD-A197 917

*CRANDALL, M. G. * * *

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Some Problems in Nonlinear
Analysis.
AD-A198 810

*CRASEMANN, BERND * * *

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on Electron-Impact Excitation Rates
for Be-Like Ions,
AD-A198 407

*CROSLEY, DAVID R. * * *

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Diatomic Radicals.
AD-A200 357

*CRUSE, T. A. * * *

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Advanced Modeling for Fatigue
Growth of Small Surface Cracks.
AD-A198 077

*DAGDIGIAN, PAUL J. eee

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Energetics and Spin- and Lambda-
Doublet Selectivity in the Infrared
Multiphoton Dissociation HN₃(X 1A)
Yields N₂(X 1 Sigma sub g(+)) +
NH(X 3 Sigma(-), A 1 Delta):
Theory,
AD-A199 928

PERSONAL AUTHOR INDEX-8
UNCLASSIFIED EVJJOOF

COL-DAG

- *DALLAS, CHAM E * * *
Validation and Application of
Pharmacokinetic Models for
Interspecies Extrapolations in
Toxicity Risk Assessments of
Volatile Organics.
AD-A200 034
- *DALTON, LARRY R. * * *
Development of Conducting Polymers
of High Structural Strength.
AD-A200 310
- *DARRAH, RODNEY C. * * *
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AD-A198 820
- * * *
Air Force Research Initiation
Program. 1986 Technical Report.
Volume 2.
AD-A198 821
- * * *
Air Force Research Initiation
Program. 1986 Technical Report.
Volume 3.
AD-A198 822
- *DAS GUPTA, AVAJIITE * * *
Microstructure, Porosity and
Mechanical Property Relationships
of Calcium-Silicate-Hydrate.
AD-A200 120
- *DAVE, PARITOSH R. * * *
Transannular Cyclizations in the
Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,
9)undecane-8,11-dione System: A
reinvestigation.
AD-A198 028
- * * *
Reductive Amination of
Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,
9)undecane-8,11-dione.
AD-A198 222
- *DAVE, PARITOSH R. * * *
A Dimer Ketone Formed via Fe(CO)5-
Promoted Coupling of 7-
Phenoxynorbornadiene to Carbon
Monoxide.
AD-A197 884
- *DAVIDIAN, M * * *
A Note on Extended Quasi-
Likelihood.
AD-A198 042
- * * *
Variance Function Estimation.
AD-A199 822
- * * *
Variance Functions and the Minimum
Detectable Concentration in Assays.
AD-A200 203
- *DELISI, DONALD P. * * *
Equatorial Semiannual Oscillation
in Zonally Averaged Temperature
Observed by the Nimbus 7 SAMS
(stratospheric and Mesospheric
Sounder) and LIMS (Limb Infrared
Monitor of the Stratosphere).
AD-A200 567
- *DELISI, DONALD P. * * *
Studies of Internal Wave/Mean Flow
Interactions.
AD-A199 849
- *DELORENZO, ROBERT J. * * *
The Effects of Hydrazines on
Neuronal Excitability.
AD-A200 199
- *DE LOZANNE, ALEX * * *
Tunneling Microscopy of
Superconductors and Tunneling
Barriers.
AD-A197 686
- *DESAT, C. S. * * *
PERSONAL AUTHOR INDEX-9
UNCLASSIFIED EVJ00F
- * * *
Constitutive Modeling of Joints
under Cyclic Loading. Part 1.
Modeling and Testing of Idealized
Rock Joints.
AD-A200 232
- *DEWAR, MICHAEL J. * * *
AM1 Parameters for Zinc.
AD-A197 922
- * * *
An AM1 Study of the Cope
Rearrangements of Bullvalene,
Barbaralane, Semibullvalene, and
Derivatives of Semibullvalene.
AD-A198 021
- * * *
Mechanism of Chain Extension Step
in Biosynthesis.
AD-A198 138
- * * *
Mechanism of the 1,5-Sigmatropic
Hydrogen Shift in 1,3-Pentadiene.
AD-A200 194
- * * *
AM1 Calculations for Compounds
Containing Boron.
AD-A200 196
- *DEWAR, MICHAEL J. * * *
A New Mechanism for
Superconductivity.
AD-A198 404
- *DICK, R. D. * * *
Geotechnical Centrifuge Modeling of
Explosion Induced Craters - A Check
for Scaling Effects.
AD-A200 280
- *DIETER, KENNETH M. * * *
Mechanism of Chain Extension Step
in Biosynthesis.
AD-A198 138
- *DISQUE, ROBERT C. * * *
DAL-DIS

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Research on the Statistics of Grain Lattice Echoes and Their Use in Grain Size Estimation and Grain Echo Suppression.
AD-A199 811

*DITCHEK, B * * *
Transport and Junction Physics of Semiconductor-Metal Eutectic Composites.
AD-A198 480

*DIXIT, S. N * * *
(2+1) REMPI (Resonant-Enhanced Multiphoton Ionization) of NO via D 2 Sigma(+) State: Rotational Branching Ratios.
AD-A198 134

(1+1)CDAD: A New Technique for Studying Photofragment Alignment.
AD-A198 278

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Ionic Rotational Branching Ratios in Resonant Enhanced Multiphoton Ionization of NO via the A 2Sigma + (3s sigma) and D 2Sigma + (3p sigma) States.
AD-A198 330

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Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (Resonantly Enhanced Multiphoton Ionization) of NO.
AD-A198 367

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(1+1) Resonant Enhanced Multiphoton Ionization via the A 2 Sigma + State of NO: Ionic Rotational Branching Ratios and Their Intensity Dependence.
AD-A198 453

*DIXIT, S. N. * * *
Atomic and Molecular Alignment from Photoelectron Angular Distributions in (n+1) Resonantly Enhanced

Multiphoton Ionization.
AD-A198 277

*DOBRY, RICARDO * * *
Small Strain Response of Random Arrays of Elastic Spheres Using a Nonlinear Distinct Element Procedure.
AD-A198 281

*DOLL, G. L. * * *
Electronic and Structural Studies of Carbon/Carbon Composites.
AD-A198 007

*DOUBLEDAY, CHARLES, JR. * * *
Dynamics of Interaction between a 1,9-Biradical and Lanthanide Ions.
AD-A198 086

*DRESSELHAUS, M. S. * * *
Electronic and Structural Studies of Carbon/Carbon Composites.
AD-A198 007

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Intercalation and Electrical Properties of Highly Ordered Graphite Fibers.
AD-A198 508

*DRESSER, M. J. * * *
DIET in the Second Layer: An ESDIAD (Electron Stimulated Desorption Ion Angular Distribution) Study of NH3 on a CO Layer on Ni(111) and Ni(110).
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AD-A198 505

*DUBS, R. L.

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Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (Resonantly Enhanced Multiphoton Ionization) of NO.
AD-A198 367

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Atomic and Molecular Alignment from Photoelectron Angular Distributions in (n+1) Resonantly Enhanced Multiphoton Ionization.
AD-A198 277

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(1+1)CDAD: A New Technique for Studying Photofragment Alignment.
AD-A198 278

*DUNKERTON, TIMOTHY J. * * *
Equatorial Semiannual Oscillation in Zonally Averaged Temperature Observed by the Nimbus 7 SAMS (stratospheric and Mesospheric Sounder) and LIMS (Limb Infrared Monitor of the Stratosphere).
AD-A200 567

*DVORAK, GEORGE J. * * *
Analytical and Experimental Characterization of Damage Processes in Composite Laminates.
AD-A198 068

*DYER, MARK J. * * *
Two-Photon-Excited Fluorescence Spectroscopy of Atomic Fluorine at 170 nm.
AD-A199 240

*EASTMAN, L. F. * * *
Compound Semiconductor Materials, Devices and Circuits.
AD-A197 640

*EGBERT, W. C.

PERSONAL AUTHOR INDEX-10
UNCLASSIFIED EVJ00F

DIY-EG8

- * * *
Polymeric Heterostructure Thin Films,
AD-A200 363
- *EGETH, HOWARD E. * * *
Preattentive and Attentive Visual Information Processing.
AD-A197 670
- *EGGERT, DAVID * * *
A 3-D Object Recognition System Using Aspect Graphs.
AD-A198 472
- *EHLERS, F. E. * * *
Coupling Linearized Far-Field Boundary Conditions with Nonlinear Near-Field Solutions in Transonic Flow.
AD-A198 721
- *EHRlich, D. J. * * *
Proceedings of the Topical Meeting on the Microphysics of Surfaces, Beams, and Adsorbates (2nd) Held in Santa Fe, New Mexico on 18-18 February 1987.
AD-A197 601
- *EICHMANN, GEORGE * * *
Optical Acquisition, Image and Data Compression.
AD-A199 853
- *ELLIS, ROBERT L. * * *
Applications of Operator Theory to Maximum Entropy Problems.
AD-A200 586
- *ELSINGA, PAUL A. * * *
Pump/Probe Method for Fast Analysis of Visible Spectral Signatures Utilizing Asynchronous Optical Sampling.
AD-A198 318
- *ENDER, D. A. * * *
Polymeric Heterostructure Thin Films.
AD-A200 363
- *ENDO, MORIOBU * * *
Intercalation and Electrical Properties of Highly Ordered Graphite Fibers.
AD-A198 508
- *ENGBLOM, JOHN J. * * *
Nonlinear Dynamic Responses of Composite Rotor Blades.
AD-A200 145
- *ENGELHARDT, MAX * * *
Test of Equal Gamma-Distribution Means with Unknown and Unequal Shape Parameters.
AD-A200 368
- *ESWARAN, V. * * *
An Examination of Forcing in Direct Numerical Simulations of Turbulence.
AD-A198 276
- *EWIG, C. S. * * *
Basis Set Effects and the Choice of Reference Geometry in Ab Initio Calculations of Vibrational Spectra.
AD-A199 238
- *EWIG, CARL S. * * *
An Ab Initio Study of the Structure and Bonding of Pralidoxime and Its Conjugate Base.
AD-A200 532
- *FAHLNER, PAUL * * *
Dynamics of Interaction between a 1,8-Biradical and Lanthanide Ions.
AD-A198 086
- *FAIRALL, C. W. * * *
Long Term Studies of the Refractive Index Structure Parameter in the Troposphere and Stratosphere.
AD-A198 313
- *FARAH, M. J. * * *
Individual Differences in Attention.
AD-A198 624
- *FAURIE, JEAN-PIERRE * * *
MBE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.
AD-A187 752
- * * *
MBE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.
AD-A198 421
- *FIELD, R. W. * * *
High Resolution Spectroscopic Studies of Small Molecules.
AD-A199 837
- *FIELD, ROBERT W. * * *
Laser Fluorescence Excitation Spectrum of Jet-Cooled Tropolone: The A(1) B sub 2 - X(1) A sub 1 System.
AD-A199 730
- *FISHMAN, K. L. * * *

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Constitutive Modelling of Joints under Cyclic Loading. Part 1. Modelling and Testing of Idealized Rock Joints.
AD-A200 232

*FLEWING, E * * *
High Pulsed Power, Self Excited Magnetohydrodynamic Power Generation Systems.
AD-A200 258

*FOKAS, A. S. * * *
Collective Properties of Neural Systems and Their Relation to Other Physical Models.
AD-A198 988

*FORBES, JEFFREY M * * *
Electromechanical Feedback Processes in the Ionosphere.
AD-A198 235

*FORREST, STEPHEN R. * * *
Investigations of the Optical and Electronic Properties of Crystalline Organic Materials.
AD-A200 074

*FOURNEY, W. L. * * *
Geotechnical Centrifuge Modeling of Explosion Induced Craters - A Check for Scaling Effects.
AD-A200 280

*FREEMAN, A. J. * * *
Intermolecular Interactions and Crystal Stabilities of Tetraethiafulvalene-tetracyanoquinodimethane.
AD-A200 361

*FREYMUTH, P * * *
Unsteady Separated Flows:

Structures and Processes.
AD-A200 222

*FRIEDMAN, MORTON B. * * *
Massive Symbolic Mathematical Computations and Their Applications.
AD-A200 253

*GALLAGHER, A. * * *
Collisional Energy Pooling for $Sr(5\ 3P)$ + $Sr(5\ 3P)$ Yields $Sr(6\ (3,1)S)$ + $Sr(5\ 1S)$.
AD-A200 225

*GALLAGHER, T. F. * * *
Structure Dynamics of Excited Atoms.
AD-A198 147

*GALLO, JAMES * * *
Validation and Application of Pharmacokinetic Models for Interspecies Extrapolations in Toxicity Risk Assessments of Volatile Organics.
AD-A200 034

*GARDNER, DANIEL * * *
Symbolic Processor Based Models of Neural Networks.
AD-A200 200

*GATOS, HARRY C. * * *
Investigation of Defect and Electronic Interactions Associated with GaAs Device Processing.
AD-A200 541

*GAVALER, J. R. * * *
Superconducting Electronic Film Structures.
AD-A200 534

*GEBALLE, T. H. * * *

Detectors of Infrared Radiation Based on High T(c) Superconducting YBCO Films.
AD-A198 820

*GEORGE, THOMAS F. * * *
Coupled s-Wave and d-Wave States in the Heavy Fermion Superconductor U sub 1-x Th sub x Be sub 13.
AD-A197 124

* * *
Theory of Laser-Pulse-Induced Molecular Dynamics: Gas-Phase Molecular Collisions and Absorb Dynamics.
AD-A197 871

* * *
Memory-Induced Extra Resonances of Adsorbates.
AD-A198 211

* * *
Electronic States of the Xe(n)HCl Systems in Gas and Condensed Phases.
AD-A198 792
Line Shape of an Atom-Crystal Bond.
AD-A200 362

*GEORGE, THOMAS F. * * *
Anomalies in the Heat-Capacity Signatures of Submonolayer Adsorbates with Attractive Lateral Interactions.
AD-A198 382

*GERBY, D. J. * * *
Polymeric Heterostructure Thin Films.
AD-A200 363

*GERDIN, GLENN A. * * *
Opening Switch Research on a Plasma Focus VI.
AD-A198 155

PERSONAL AUTHOR INDEX-12
UNCLASSIFIED EVJ00F

FLE-GER

- *GHOSH, A. K * * *
Processability and High Temperature Behavior of Emerging Aerospace Alloys.
AD-A199 926
- *GHOSH, SUBIR * * *
Efficient Nearly Orthogonal Deletion Designs.
AD-A197 923
- *GIAMEI, A. F. * * *
Dispersion Strengthening of High Temperature Niobium Alloys.
AD-A199 958
- *GIBELING, JEFFREY C. * * *
High Temperature Mechanical Testing Facilities.
AD-A200 565
- *GILLETTE, GREGORY R * * *
A New Route to 1,4-Disilabenzene and 1,4-Disilabarrelene.
AD-A200 207
- *GOHBERG, ISRAEL * * *
Applications of Operator Theory to Maximum Entropy Problems.
AD-A200 586
- *GOLDMAN, A. S. * * *
Photochemical Generation of Nineteen-Electron Organometallic Complexes and Their Use as Reducing Agents in Micellar Systems.
AD-A197 885
- *GOODINGS, D. J. * * *
Geotechnical Centrifuge Modeling of Explosion Induced Craters - A Check for Scaling Effects.
AD-A200 290
- *GORDON, MARK S. * * *
Theoretical Studies of Silacyclobutanes and Silacyclobutenes, $CnSi(4-n)H_8$ ($n = 0-4$).
AD-A197 953
- *GORDON, MARK S. * * *
The Electronic and Molecular Structure of Silyl Nitrene.
AD-A198 270
- *GORDON, MARK S. * * *
Potentially Aromatic Metallocycles.
AD-A197 765
- *GORDON, PETER C. * * *
Context Effects in Recognizing Syllable-Final /z/ and /s/ in Different Phrasal Positions.
AD-A199 923
- *GOSS, LARRY P. * * *
Surface Thermometry of Energetic Materials by Laser-Induced Fluorescence.
AD-A198 084
- *GRAY, DONALD H. * * *
Constitutive Behavior of Fiber Reinforced Sands.
AD-A200 524
- *GRAY, R. * * *
Norepinephrine Enhances Long-Term Potentiation at Hippocampal Mossy Fiber Synapses.
AD-A197 990
- *GRAY, RICHARD * * *
Cellular Mechanisms of Noradrenergic Enhancement of Long-Term Synaptic Potentiation in Hippocampus.
AD-A197 191
- *GREEN, DAVID W. * * *
Complex Auditory Signals.
AD-A199 832
- *GREENFIELD, SCOTT R. * * *
Competition among Collisional Deactivation, Ionization, and Dissociation in the Multiphoton Excitation of Octafluorocyclooctatetraene.
AD-A200 508
- *GRIFFIN, ANSELM C. * * *
Synthesis of Side Chain Liquid Crystal Polymers for Nonlinear Optics.
AD-A200 368
- *GRUBBIN, H. L. * * *
Pyridine N-Oxides as Polymeric Nonlinear Optical Materials.
AD-A200 387
- *GRUNZE, W. * * *
Novel Liquid Crystals - Polymers and Monomers - As Nonlinear Optical Materials.
AD-A200 075
- *GRUNZE, W. * * *
Studying Quantum Phase-Based Electronic Devices.
AD-A200 376
- *GRUNZE, W. * * *
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AD-A197 759

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Microstructure, Porosity and
Mechanical Property Relationships
of Calcium-Silicate-Hydrate.
AD-A200 120
- *GUERRA, MIGUEL A * * *
Synthesis of Trifluorosilyl
Organometallic Complexes from
Trifluorosilyl Radicals and Metal
Atoms.
AD-A198 580
- *GUHA, ALOKE * * *
Optical Symbolic Processor for
Expert System Execution.
AD-A197 668
- *GUNBURGER, MAX D. * * *
Parallel Algorithms in the Finite
Element Approximation of Flow
Problems.
AD-A197 454
- *GUPTA, UDAY * * *
Modeling of Atomic Processes for X-
Ray Laser Plasmas.
AD-A200 219
- *GUSTAFSON, J. * * *
Transport and Junction Physics of
Semiconductor-Metal Eutectic
Composites.
AD-A198 480
- *HADDAD, WASSIM M * * *
Unified Optimal Projection
Equations for Simultaneous Reduced-
Order, Robust Modelling, Estimation
and Control.
AD-A198 381
- *GRUBER, MICHAEL W * * *
Robust, Reduced-Order, Nonstrictly
Proper State Estimation via the
- Optimal Projection Equations with
Guaranteed Cost Bounds.
AD-A198 397
- *HADDAD, WASSIM M. * * *
The Optimal Projection Equations
With Petersen-Hollot Bounds: Robust
Stability and Performance via Fixed-
Order Dynamic Compensation for
Systems with Structured Real-Valued
Parameter Uncertainty.
AD-A198 396
- *HAERDLE, WOLFGANG * * *
A Note on Second Order Effects in a
Semiparametric Context.
AD-A198 018
- *HAGER, J. * * *
Sub-Micron Carbon Filaments for
Optical Applications.
AD-A198 878
- *HAGLUND, RICHARD F., JR. * * *
Electronic Interactions of
Electrons, Photons, and Atoms with
Material Surfaces.
AD-A199 628
- *HALL, G. E. * * *
Vector Correlations in the
Photodissociation of CH₃I, OCS, and
Glyoxal.
AD-A198 332
- *HALL, PETER * * *
Nonparametric Estimation of Optimal
Performance Criteria in Quality
Engineering.
AD-A198 315
- *HALL, PETER * * *
Optimal Rates of Convergence for
Deconvolving a Density.
- AD-A197 748 * * *
Variance Function Estimation in
Regression: The Effect of
Estimating the Mean.
AD-A198 228
- *HANDEL, PETER H. * * *
Fundamental Quantum 1/F Noise in
Ultrasmall Semiconductor Devices
and Their Optimal Design
Principles.
AD-A198 462
- *HANSON, RONALD K. * * *
Digital Imaging of Laser-Ignited
Combustion.
AD-A200 329
- *HAPPER, WILLIAM * * *
The Physics of Spin Polarized
Atomic Vapors.
AD-A199 990
- *HARMON, H. J. * * *
Interaction of Hydrophobic
Molecules with Heme Proteins.
AD-A198 747
- *HARRI, H.-P. * * *
Vector Correlations in the
Photodissociation of CH₃I, OCS, and
Glyoxal.
AD-A198 332
- *HARRIS, M. * * *
Collisional Energy Pooling for Sr(5
3P) + Sr(5 3P') Yields Sr(6
(3,1)S) + Sr(5 1S).
AD-A200 225
- *HASEGAWA, AKIRA * * *
Alfven Waves in a Cold Plasma with
Curved Magnetic Fields.

PERSONAL AUTHOR INDEX-14
UNCLASSIFIED EVJJOOF

GRU-HAS

AD-A200 312

*HAWLEY, KEVIN J

Individual Differences in
Attention.

AD-A199 824

*HAYES, BARBARA C. e e e e e

Circuit Behavior in the Development
of Neuronal Networks.

AD-A198 040

*HEALY, EAMONN F

Mechanism of the 1,5-Sigmatropic
Hydrogen Shift in 1,3-Pentadiene,
AD-A200 194

*HELLER, URSULA e e e

A Martingale Characterization of
Mixed Poisson Processes.

AD-A198 022

*HELLWARTH, ROBERT W. e e e e e

Optical Beam Phase-Conjugation and
Electromagnetic Scattering Process
with Intense Fields.

AD-A200 372

*HELMS, A.L., JR

UHV Transport System for Laser
Irradiation Studies.

AD-A200 330

*HENCH, LARRY L. e e e

Ultrastructure Processing and
Environmental Stability of Advanced
Structural and Electronic
Materials.

AD-A199 905

*HENRY, GEORGE K

Diels-Alder Reactions of 1,1-
dimethyl-2,3,4,5-tetraphenyl-1-silacyclopentadiene, 1,1-dimethyl-
2,5-diphenyl-1-silacyclopentadiene
and 1,1-dimethyl-3,4-diphenyl-1-
silacyclopentadiene with Maleic
Anhydride; Kinetic Measurements,
AD-A200 385

*HERNANDEZ-LERMA, ONESIMO

Adaptive Policies for Discrete-Time
Stochastic Control Systems with
Unknown Disturbance Distribution,
AD-A198 069

*HERNANDEZ, G e

Afocal Coupled Etalons. DEM: A High
-Resolution Double-Etalon Modulator
Spectrometer,
AD-A198 296Investigations of the Dynamics and
Thermodynamics of the Mesosphere
and Upper Thermosphere at the Polar
Regions.

AD-A198 463

*HERRING, G. C

Two-Photon-Excited Fluorescence
Spectroscopy of Atomic Fluorine at
170 nm.

AD-A199 240

*HERTZBERG, J. R

Structure and Propagation of
Turbulent Premixed Flames
Stabilized in a Stagnation Flow,
AD-A198 452

*HESS, B. A., JR

Basis Set Effects and the Choice of
Reference Geometry in Ab Initio
Calculations of Vibrational
Spectra,

AD-A199 238

*HO, CHIH-MING

* * *

Studies of Unsteadiness in Boundary
Layers.

AD-A199 988

*HOLT, E. W

* * *

Dialkylamino Phosphorus Metal
Carbonyls. 6. Chemistry of
(Tris(diliosopropylamino)triphosphine)
diron Hexacarbonyl Derivatives
Including the Synthesis and
Structure of Heterometallic
Derivatives 1-4.

AD-A196 581

* * *

Dialkylamino Phosphorus Metal
Carbonyls. 4. Novel Phosphorus-
Bridging Carbonyl Derivatives and
Triphosphine Derivatives from
Reactions of Tetracarbonylferrate(-
II) with (Dialkylamino)dichlorophos-
phines 1-4.

AD-A198 564

*HOLT, E. W. e

* * *

Novel ((Diliosopropylamino)triphosphin-
e)hexacarbonyldiron Complexes.

AD-A197 987

* * *

(Dialkylamino)phosphorus Metal
Carbonyls. 5. Chemical Reactivity
of the Phosphorus-Bridging Carbonyl
Group in Carbonylbis((diliosopropylam-
ino)phosphido)hexacarbonyldiron(1-
4).

AD-A198 327

*HONG, ALFRED Y. e e e e e

* * *

Experimental Study of Plasmoid
Formation and Transport by Means of
Moving Magnetic Fields.

AD-A200 005

*HOPKINS, W. F

* * *

Norepinephrine Enhances Long-Term
Potentiation at Hippocampal Mossy
Fiber Synapses.

AD-A197 990

PERSONAL AUTHOR INDEX-15
UNCLASSIFIED
EVJ00F

HAW-HOP

UNCLASSIFIED

- *HOPKINS, WILLIAM F * * *
Cellular Mechanisms of
Noradrenergic Enhancement of Long-
Term Synaptic Potentiation in
Hippocampus,
AD-A197 191
- *HORVATH, RAYMOND F * * *
Anionic Ring-Opening Polymerization
of Sila- and Germacyclopent-3-enes,
AD-A197 874
- *HOUDRE, CHRISTIANE * * *
Harmonizability, V-Boundedness,
(2P)-Boundedness of Stochastic
Processes,
AD-A200 077
- *HOUSTON, P. L * * *
State-Selective Studies of Y Yields
R, V Energy Transfer: The H + CO
system,
AD-A198 373
- *HOWARD, JUDITH A * * *
Chemistry of Polynuclear Metal
Complexes with Bridging Carbene or
Carbyne Ligands. Part 75. Reactions
of Octacarbonyldicobalt with the
Salts (X)(W(triple bond
CR)(CO)2(eta 5-C2B9H9Me2)) (X =
NEt4 or PPh4; R = Me, Ph, C6H4Me-2
or C6H4Me-4); Crystal Structure of
(PPh4)(Co2W(mu sub 3-CPh)(CO)8(eta
5-C2B9H9Me2)). 0.5CH2Cl2,
AD-A200 065
- *Chemistry of Polynuclear Metal
Complexes with Bridging Carbene or
Carbyne Ligands. Part 74. Salts of
the Anions (W(Triple Bond CR)(CO)2
(Eta(5)-C2B9H9Me2))-(R-C6H4Me-2
C8H3Me2-2,6) as Reagents for the
Synthesis of Compounds with
Heteronuclear Metal-Metal Bonds:
Crystal Structure of (N(Et)4)-
(FeW(mu-CC6H3Me2-2,6)(CO)5(Eta(5)-
C2B9H9Me2))),
AD-A200 218
- *HOWELL, GREG A. * * *
Pyridine N-Oxides as Polymeric
Nonlinear Optical Materials,
AD-A200 367
- *HOYLE, SUSAN Q * * *
Microstructure, Porosity and
Mechanical Property Relationships
of Calcium-Silicate-Hydrate,
AD-A200 120
- *HSIAO, C. C * * *
Grazing in Polymeric and Composite
Systems,
AD-A198 372
- *HUBBARD, ARTHUR T * * *
Electrochemistry at Well-
Characterized Surfaces,
AD-A197 453
- *HUERRE, PATRICK * * *
Studies of Unsteadiness in Boundary
Layers,
AD-A199 989
- *HUGHES, RUSSELL P. * * *
Competition among Collisional
Deactivation, Ionization, and
Dissociation in the Multiphoton
Excitation of
Octafluorocyclooctatetraene,
AD-A200 506
- *HUNG, ROBERT S. * * *
Synthesis of Side Chain Liquid
Crystal Polymers for Nonlinear
Optics,
AD-A200 386
- *HUO, W. M. * * *
Ionic Rotational Branching Ratios
in Resonant Enhanced Multiphoton
Ionization of NO Via the A 2Sigma +
(3s sigma) and D 2Sigma + (3p
sigma) States,
AD-A188 330
- (1+) Resonant Enhanced Multiphoton
Ionization via the A 2 Sigma +
State of NO: Ionic Rotational
Branching Ratios and Their
Intensity Dependence,
AD-A188 453
- *HUO, WINIFRED M. * * *
(2+) REMPI (Resonant-Enhanced
Multiphoton Ionization) of NO via D
2 Sigma(+) State: Rotational
Branching Ratios,
AD-A188 134
- *IRVIN, BENJAMINE * * *
Spectroscopic and Light Scattering
Instrumentation Proposal,
AD-A199 991
- *JACOBS, BARRY L. * * *
Bioreactivity: Studies on a Simple
Brain Stem Reflex in Behaving
Animals,
AD-A199 404
- *JANISZEWSKA, L. * * *
Formation and Electrochemistry of
Polyfluorene in Ambient Temperature
Ionic Liquids,
AD-A198 383
- *JANISZEWSKA, LAURA * * *
Electrochemistry of Polythiophene
and Polybithiophene Films in
Ambient Temperature Molten Salts.
AD-A198 565

PERSONAL AUTHOR INDEX-16
UNCLASSIFIED EVJ00F

HOP-JAN

- *JEFFRIES, JAY B.***
State-Specific Energy Transfer in
Diatomic Radicals.
AD-A200 357
- *JENKINS, B. K.***
Research in Optical Symbolic
Computing Tasks.
AD-A199 998
- *JENKINS, DAVID A.***
Strength and Deformation of
Confined and Unconfined Concrete
Under Axial Dynamic Loading.
AD-A199 930
- *JIANG, YANAN ***
Pump/Probe Method for Fast Analysis
of Visible Spectral Signatures
Utilizing Asynchronous Optical
Sampling.
AD-A198 318
- *JIE, CAO XIAN ***
An AM1 Study of the Cope
Rearrangements of Bullvalene,
Barbaralane, Semibullvalene, and
Derivatives of Semibullvalene.
AD-A198 021
- *JIE, CAO XIAN ***
AM1 Calculations for Compounds
Containing Boron.
AD-A200 198
- *JOHNSON, KRISTINA M.***
Instrumentation Request for Optical
Symbolic Computing.
AD-A197 581
- *JOHNSTON, DANIEL***
Cellular Mechanisms of
Noradrenergic Enhancement of Long-
Term Synaptic Potentiation in
Hippocampus.
AD-A197 191
- *JOHNSTON, DANIEL***
Norepinephrine Enhances Long-Term
Potentiation at Hippocampal Mossy
Fiber Synapses.
AD-A197 990
- *JOHNSTON, WILLIAM A.***
Individual Differences in
Attention.
AD-A199 624
- *JONES, PAUL R.***
Polysilylated Unsaturated
Molecules.
AD-A198 492
- *JUHLKE, TIMOTHY J.***
Synthesis of Trifluorosilyl
Organometallic Complexes from
Trifluorosilyl Radicals and Metal
Atoms.
AD-A198 580
- *JUSINSKI, LEONARD E.***
Two-Photon-Excited Fluorescence
Spectroscopy of Atomic Fluorine at
170 nm.
AD-A199 240
- *KALLIANPUR, G.***
A Langevin-Type Stochastic
Differential Equation on a Space of
Generalized Functionals.
AD-A199 809
- *KALLIANPUR, G.***
Diffusion Equations in Duals of
Nuclear Spaces.
AD-A200 078
- *KAR, A.***
Thermal Analysis System (DSC, TGA,
TMA) for Oxidation and Phase
Transformation Studies of Alloys
with Metastable Phase.
AD-A198 420
- *KARPUR, PRASANNA ***
Research on the Statistics of Grain
Lattice Echoes and Their Use in
Grain Size Estimation and Grain
Echo Suppression.
AD-A199 811
- *KATER, S. B.***
Circuit Behavior in the Development
of Neuronal Networks.
AD-A198 040
- *KAUFMAN, LLOYD ***
Perceptual Factors in Workload: A
neuromagnetic Study.
AD-A198 487
- *KEEPER, DENNIS ***
Laser Thermal Propulsion.
AD-A200 558
- *KEEPER, DENNIS R.***
Abel Inversion Using Transform
Techniques.
AD-A198 235
- *KELLER, A.***
Stochastic Evolution Equations
- *KAUFMAN, LLOYD ***
Perceptual Factors in Workload: A
neuromagnetic Study.
AD-A198 487
- *KEEPER, DENNIS ***
Laser Thermal Propulsion.
AD-A200 558
- *KEEPER, DENNIS R.***
Abel Inversion Using Transform
Techniques.
AD-A198 235
- *KELLER, A.***
Stochastic Evolution Equations

On Functional Estimates for Ill-Posed Linear Problems.
AD-A198 004

*KELLY, DONALD H. ^{***}

Role of Retinocortical Processing in Spatial Vision.
AD-A200 198

*KELLY, J. F. ^{***}

Collisional Energy Pooling for $\text{Sr}(5\text{ 3pJ}) + \text{Sr}(5\text{ 3pJ})$ Yields $\text{Sr}(6\text{ (3,1)S}) + \text{Sr}(5\text{ 1S})$.
AD-A200 225

*KHOO, IAM-CHOON ^{***}

Studies of Optical Wave Front Conjugation and Imaging Properties of Nematic Liquid Crystal Films.
AD-A197 918

*KIM, DAI-UK ^{***}

Absorption of Gaseous Iodine by Polythiophene Films and Powders.
AD-A198 218

Thermodynamically Reversible Uptake of Electrically Active Dopants in Conducting Polymers: Iodine in Polythiophene.
AD-A198 378

*KIM, G. ^{***}

Holes, Electrons, Polarons, and Bipolarons and the Thermodynamics of Electrically Active Dopants in Conducting Polymers.
AD-A198 402

*KIM, G. ^{***}

Rheological Studies on Blends of Rodlike and Flexible Chain Polymers.
AD-A198 455

*KIM, J. S. ^{***}

Extinction of Interacting Premixed Flames: Theory and Experimental Comparisons.
AD-A198 279

*KIM, S. H. ^{***}

Investigation of Acceleration and Densification of Electrons Utilizing Travelling Magnetic Waves.
AD-A197 700

*KIM, YOUNG S. ^{***}

Anomalies in the Heat-Capacity Signatures of Submonolayer Adsorbates with Attractive Lateral Interactions.
AD-A198 382

*KING, GALEN B. ^{***}

Pump/Probe Method for Fast Analysis of Visible Spectral Signatures Utilizing Asynchronous Optical Sampling.
AD-A198 318

*KING, R. B. ^{***}

Novel ((Diisopropylamino)triphosphine)hexacarbonyldiron Complexes.
AD-A197 997

*KING, R. B. ^{***}

((Diisopropylamino)phosphorus Metal Carbonyls. 5. Chemical Reactivity of the Phosphorus-Bridging Carbonyl Group in Carbonylbis((diisopropylamino)phosphido)hexacarbonyldiron(1-4).
AD-A198 327

*KING, R. B. ^{***}

((Diisopropylamino)phosphorus Metal Carbonyls. 6. Chemistry of (Tris(diisopropylamino)triphosphine)diron Hexacarbonyl Derivatives Including the Synthesis and Structure of Heterometallic Derivatives 1-4.
AD-A198 561

*KIM, S. H. ^{***}
Diisopropylamino Phosphorus Metal Carbonyls. 1. Mononuclear Derivatives from Reactions of Bis(diisopropylamino)phosphine with Metal Carbonyls.
AD-A198 563

*KIM, S. H. ^{***}
Diisopropylamino Phosphorus Metal Carbonyls. 4. Novel Phosphorus-Bridging Carbonyl Derivatives and Triphosphine Derivatives from Reactions of Tetracarbonylferrate(II) with (Diisopropylamino)dichlorophosphines 1-4.
AD-A198 584

*KIM, S. H. ^{***}

Diisopropylamino Phosphorus Metal Carbonyls. 7. Trinuclear Iron Carbonyl Derivatives from Reactions of Disodium Octacarbonyldiferrate with (Diisopropylamino)dichlorophosphine S.
AD-A200 195

*KISKINOVA, M. ^{***}

Electron Stimulated Desorption from CO Chemisorbed on Pt(111): A Dynamical Study of Positive Ion and Metastable CO Emission.
AD-A199 729

*KNEE, JOSEPH L. ^{***}

Ultrafast Laser Spectroscopy of Chemical Reactions.
AD-A198 328

*KNEISLER, RONALD J. ^{***}

Pump/Probe Method for Fast Analysis of Visible Spectral Signatures Utilizing Asynchronous Optical Sampling.
AD-A198 318

*KNUTSEN, KAREN ^{***}

Remasurement of the Rate Constant and Branching Ratio for the $\text{N}(2)^+ +$

- O Reaction.
AD-A198 389
- *KONOWALOW, D. D. * * *
Electronic Assignments of the
Violet Bands of Sodium,
AD-A199 839
- *KOSUT, ROBERT L. e e e e
* * *
Adaptive Control Techniques for
Large Space Structures.
AD-A200 208
- *KOWLER, EILEEN * * *
Eye Movements and Visual
Information Processing.
AD-A200 008
- *KRASNICKI, S * * *
Single Crystal GaAs Stoichiometry
Measurements Through Double Crystal
Diffractionometry.
AD-8126 593L
- *KRAUSKOPF, JOHNE e e e e
* * *
Higher Order Mechanisms of Color
Vision.
AD-A198 093
- *KRESKOVSKY, J. P. e e e e
* * *
Studying Quantum Phase-Based
Electronic Devices.
AD-A200 376
- *KREUZER, H. J * * *
Diffusion at Interfaces:
Microscopic Concepts. Proceedings
of a Workshop Held in Campobello
Island, Canada on August 18-22
1987. Springer Series in Surface
Sciences. Volume 12.
AD-A197 759
- *KRISHNAMURTHY, S
* * *
Semiconductor Alloy Engineering for
High-Speed Devices.
AD-A200 358
- *KRUGER, C. H * * *
Fundamental Processes in Partially
Ionized Plasmas.
AD-A198 827
- *KRUGER, JEROME * * *
Role of Surface and Thin Film
Composition and Microstructure and
Properties of Materials.
AD-A197 995
- *KRUSIUS, J. P. e e e e
* * *
Compound Semiconductor Materials,
Devices and Circuits.
AD-A197 840
- *KUNDU, T. e e
* * *
Constitutive Modelling of Joints
under Cyclic Loading. Part 1.
Modelling and Testing of Idealized
Rock Joints.
AD-A200 232
- *KUSEK, STEVE e e e e
* * *
The National Diagnostic Facility
under Construction.
AD-A198 901
- *KUTHI, ANDRAS * * *
Experimental Study of Plasmoid
Formation and Transport by Means of
Moving Magnetic Fields.
AD-A200 005
- *LAGOW, RICHARD J * * *
Synthesis of Trifluorosilyl
Organometallic Complexes from
Trifluorosilyl Radicals and Metal
Atoms.
- AD-A198 580
- *LAGOW, RICHARD J. e
* * *
New Experimental Challenges in
Elemental Fluorine Chemistry; an
Emerging Technology.
AD-A198 371
- *LAGOWSKI, JACEK * * *
Investigation of Defect and
Electronic Interactions Associated
with GaAs Device Processing.
AD-A200 541
- *LAGUREN-DAVIDSON, LAARNI * * *
Characterization of Hydroquinone
and Related Compounds Adsorbed at
Pt(111) from Aqueous Solutions:
Electron Energy-Loss Spectroscopy,
Auger Spectroscopy, Low Energy
Electron Diffraction, and Cyclic
Voltammetry.
AD-A197 715
- *LANGNER, A * * *
Coupled s-Wave and d-Wave States in
the Heavy Fermion Superconductor U
sub 1-x Th sub x Be sub 13.
AD-A197 124
- *LANKEFORD, JAMES e e e e
* * *
Study of High Temperature Failure
Mechanisms in Ceramics.
AD-A198 375
- *LANZILLOTTI, A.-M * * *
DIET in the Second Layer: An ESDIAD
(Electron Stimulated Desorption Ion
Angular Distribution) Study of NH₃
on a Cd Layer on Ni(111) and
Ni(110).
AD-A197 870
- Observation of Molecular Rotors on
Surfaces by ESDIAD (Electron

UNCLASSIFIED

Stimulated Desorption Ion Angular Distribution): Studies of PF₃ and NH₃ Chemisorption on Ni Surfaces, AD-A198 505 * * *

Electron Stimulated Desorption from CO Chemisorbed on Pt(111): A dynamical Study of Positive Ion and Metastable CO Emission, AD-A198 729

*LARSON, STEVEN B. eeee * * *

Synthesis of Trifluorosilyl Organometallic Complexes from Trifluorosilyl Radicals and Metal Atoms, AD-A198 560

*LAST, ISIDORE * * *

Electronic States of the Xe(n)HCl Systems in Gas and Condensed Phases, AD-A199 792

*LAVID, MOSHE e * * *

Radiative Augmented Combustion, AD-A197 300

*LAW, C. C * * *

Fundamental Understanding of the Intrinsic Ductility in Nickel-Base L1 sub 2 Type Alloys, AD-A197 605

*LAW, C. K * * *

Extinction of Interacting Premixed Flames: Theory and Experimental Comparisons, AD-A198 279 * * *

Propagation and Extinction of Stretched Premixed Flames, AD-A198 450 * * *

Structure and Propagation of Turbulent Premixed Flames

Stabilized in a Stagnation Flow, AD-A198 452

*LAW, C. K. e * * *

Theory of Nonadiabatic Flame Propagation in Dissociation Equilibrium, AD-A198 019 * * *

Asymptotic Structure and Extinction of Diffusion Flames with Chain Mechanism, AD-A200 332

*LAW, CHUNG K. eeee * * *

Aerodynamic and Kinetic Processes in Flames, AD-A198 474

*LAWS, NORMAN e * * *

Analytical and Experimental Characterization of Damage Processes in Composite Laminates, AD-A198 068

*LAWSON, M. D * * *

Interface Stability between Two Gas Streams of Different Density in a Curved Flow, AD-A199 874

*LAY, DAVID C * * *

Applications of Operator Theory to Maximum Entropy Problems, AD-A200 568

*LEADBETTER, M. R * * *

On Exceedance Point Processes for Stationary Sequences under Mild Oscillation Restrictions, AD-A198 314

*LEE, HAI-WOONG * * *

Theory of Laser-Pulse-Induced

Molecular Dynamics: Gas-Phase Molecular Collisions and Adbond Dynamics, AD-A197 871

*LEE, HONG-GI * * *

On the Immersion of a Discrete Time Nonlinear System into a Linear System, AD-A198 316

Remarks on Discretization and Linear Equivalence of Continuous Time Nonlinear Systems, AD-A198 388 * * *

Immersion and Immersion by Nonsingular Feedback of a Discrete-Time Nonlinear System Into a Linear System, AD-A198 557

*LEE, KYUN K * * *

Affine-Feedback Stabilization of Piecewise-Linear Hypersurface Systems, AD-A198 317 * * *

Remarks on Smooth Feedback Stabilization of Nonlinear Systems, AD-A198 385

*LEE, SING H * * *

Hybrid (Optical/Electronic) Computing and Digital Computing, AD-A197 722

*LEE, Y. C. e * * *

Connectionist Models for Intelligent Computation, AD-A200 445

*LEONE, STEPHEN R * * *

Remeasurement of the Rate Constant and Branching Ratio for the Ni(2)+ O Reaction,

PERSONAL AUTHOR INDEX-20
UNCLASSIFIED EVJ00F

LAR-LEG

- AD-A198 389
- *LEONE, STEPHEN R. ***
Description of a Two-State System:
Laser Probing of Gallium Atom Spin-
Orbit States from Silicon (100).
AD-A199 239
- *LEUNG, P. C. ***
Intermolecular Interactions and
Crystal Stabilities of
Tetrathiafulvalene-
tetracyanoquinodimethane.
AD-A200 361
- *LEWIS, JOHN G. ***
Ordering Methods for Sparse
Matrices and Vector Computers.
AD-A198 291
- *LIN, ANTHONY T. ***
Computer Simulations of Radiation
Generation from Relativistic
Electron Beams.
AD-A199 627
- *LIN, J. ***
Fundamental Understanding of the
Intrinsic Ductility in Nickel-Base
L1 sub 2 Type Alloys.
AD-A197 605
- *LINZ, GARY S. ***
Structural Assignment of a
Methylcyclopentadiene-Toluquinone
Diels-Alder Cycloadduct. Analysis
of the Two-Dimensional NMR Spectrum
of 1,6-Dimethyl-1 alpha, 4 alpha
.4a alpha, 5 alpha, 8 Beta, 8a
alpha-hexahydro-1, 4-
methanonaphthalene-5, 8-diol.
AD-A197 794
- *LOO, R. O. ***
- Vector Correlations in the
Photodissociation of CH3I, OCS, and
Glyoxal.
AD-A198 332
- *LU, FRANK ***
Characterization of Hydroquinone
and Related Compounds Adsorbed at
Pt(111) from Aqueous Solutions:
Electron Energy-Loss Spectroscopy,
Auger Spectroscopy, Low Energy
Electron Diffraction, and Cyclic
Voltammetry.
AD-A197 715
- ***
Studies of L-DOPA and Related
Compounds Adsorbed from Aqueous
Solutions at Pt(100) and Pt(111):
Electron Energy-Loss Spectroscopy,
Auger Spectroscopy, and
Electrochemistry.
AD-A198 501
- *LUKENS, JAMES E. ***
Millimeter Wave Generation Using
Josephson Junction Arrays.
AD-A200 259
- *LUTTGES, M. ***
Unsteady Separated Flows:
Structures and Processes.
AD-A200 222
- *LYNCH, GARY ***
Synaptic Plasticity and Memory
Function.
AD-A198 473
- *LYTLE, FRED E. ***
Pump/Probe Method for Fast Analysis
of Visible Spectral Signatures
Utilizing Asynchronous Optical
Sampling.
AD-A198 318
- *MA, Y. ***
- ***
Constitutive Modelling of Joints
under Cyclic Loading. Part 1.
Modelling and Testing of Idealized
Rock Joints.
AD-A200 232
- *MACKENZIE, V. ***
Photochemical Generation of
Nineteen-Electron Organometallic
Complexes and Their Use as Reducing
Agents in Micellar Systems.
AD-A197 885
- *MAHONEY, JOANNE ***
Efficient Nearly Orthogonal
Deletion Designs.
AD-A197 923
- *MAKOUS, WALTER ***
New Insights on Visual Cortex.
Abstracts. Center for Visual
Science Symposium (18th) Held in
Rochester, New York on June 18-18,
1988.
AD-A189 826
- *MALVERN, LAWRENCE E. ***
Strength and Deformation of
Confined and Unconfined Concrete
Under Axial Dynamic Loading.
AD-A189 930
- *MARCHAND, ALAN P. ***
A Dimer Ketone Formed via Fe(CO)5-
Promoted Coupling of 7-
Phenoxynorbornadiene to Carbon
Monoxide.
AD-A197 884
- ***
Transannular Cyclizations in the
Pentacyclo[5.4.0.0(2,6).0(3,10).0(5,
9)]undecane-8,11-Dione System: A
reinvestigation.
AD-A189 026

UNCLASSIFIED

Reductive Amination of
Pentacyclo(5.4.0.0(2,8).0(3,10).0(5,
8))undecane-8,11-dione,
AD-A198 222

Structure of a Bis(eta4-exocyclic-
1,3-diene)Fe(CO)3 Complex,
AD-A198 319

*MARCHAND, ALAN P. e

Synthesis and Chemistry of Novel
Polynitropolycyclic Cage Molecules,
AD-A197 856

Synthesis of New
Polynitropolyhedranes.
AD-A198 320

*MARCUS, S. I. e e e e

On Adaptive Control of Stochastic
Bilinear Systems.
AD-A198 074

*MARCUS, STEVEN I

Remarks on Discretization and
Linear Equivalence of Continuous
Time Nonlinear Systems,
AD-A198 388

*MARCUS, STEVEN I. e e e e

Adaptive Policies for Discrete-Time
Stochastic Control Systems with
Unknown Disturbance Distribution,
AD-A198 069

On the Immersion of a Discrete Time
Nonlinear System into a Linear
System,
AD-A198 318

Immersion and Immersion by
Nonsingular Feedback of a Discrete-
Time Nonlinear System into a Linear
System,
AD-A198 557

*MARCUS, STEVEN I. e e

Adaptive Control of Stochastic
Bilinear Systems,
AD-A198 387

*MARKS, TOBIN J

PBT,P80-Based Hybrid Polymers with
Nonlinear Optical Properties or
High Electrical Conductivity.
AD-A200 226

*MARTIN, GARY E. e e e e

Structural Assignment of a
Methylcyclopentadiene-Toluquinone
Diels-Alder Cycloadduct. Analysis
of the Two-Dimensional NMR Spectrum
of 1,6-Dimethyl-1 alpha, 4 alpha,
4a alpha, 5 alpha, 8 Beta, 8a
alpha-hexahydro-1, 4-
methanonaphthalene-5,8-diol,
AD-A197 784

*MAUNSELL, JOHN

New Insights on Visual Cortex.
Abstracts. Center for Visual
Science Symposium (18th) Held in
Rochester, New York on June 16-18,
1988.
AD-A199 826

*MAYER, T. M

Proceedings of the Topical Meeting
on the Microphysics of Surfaces,
Beams, and Adsorbates (2nd) Held in
Sante Fe, New Mexico on 18-18
February 1987.
AD-A197 601

*MAZUMDER, J

Thermal Analysis System (DSC, TGA,
TMA) for Oxidation and Phase
Transformation Studies of Alloys
with Metastable Phase.
AD-A198 420

*MCBANE, G. C

State-Selective Studies of T Yields
R, V Energy Transfer: The H + CO
System,
AD-A198 373

*MCCARGAR, JAMES W

Studies of L-DOPA and Related
Compounds Adsorbed from Aqueous
Solutions at Pt(100) and Pt(111):
Electron Energy-Loss Spectroscopy,
Auger Spectroscopy, and
Electrochemistry,
AD-A198 501

*MCCONICA, CAROL M

Sub-Micron Carbon Filaments for
Optical Applications.
AD-A198 878

*MCKEAGUE, IAN W

Identifying Nonlinear Covariate
Effects in Semiparametric
Regression Models.
AD-A197 323

*MCKOY, V

(2+1) REMPI (Resonant-Enhanced
Multiphoton Ionization) of NO via D
2 Sigma(+) State: Rotational
Branching Ratios,
AD-A198 134

Atomic and Molecular Alignment from
Photoelectron Angular Distributions
in (n+1) Resonantly Enhanced
Multiphoton Ionization,
AD-A198 277

* * *

Ionic Rotational Branching Ratios
in Resonant Enhanced Multiphoton
Ionization of NO via the A 2Sigma +
(3s sigma) and D 2Sigma + (3p
sigma) States,
AD-A198 330

* * *

Circular Dichroism in Photoelectron

PERSONAL AUTHOR INDEX-22
UNCLASSIFIED EVJ00F

MAR-MCK

- Angular Distributions from Two-Color (1+1) REMPI (Resonantly Enhanced Multiphoton Ionization) of NO,
AD-A198 367 * * *
- (1+1) Resonant Enhanced Multiphoton Ionization via the A 2 Sigma + State of NO: Ionic Rotational Branching Ratios and Their Intensity Dependence,
AD-A198 453 * * *
- *MCKOY, V. e e e e * * *
Photoionization of the Valence Orbitals of OH,
AD-A198 331 * * *
- *MCKOY, V. e * * *
(1+1)CDAD: A New Technique for Studying Photofragment Alignment,
AD-A198 278 * * *
- *MELTZ, MARTIN L. e e * * *
Center for Basic Research in Radiation Bioeffects,
AD-A198 154 * * *
- *MERZ, KENNETH M., JR * * *
AMI Parameters for Zinc,
AD-A197 822 * * *
- *MEYER, GERARD G * * *
Fault Tolerant Parallel Implementations of Iterative Algorithms for Optimal Control Problems,
AD-A198 041 * * *
- *MIAMEE, A. G * * *
Degenerate Multivariate Stationary Processes: Basicity, Past and Future, and Autoregressive Representation,
AD-A199 929 * * *
- *MIAD, B. Q * * *
Detection of Change Points Using Rank Methods,
AD-A198 406 * * *
- *MICALSKA, D * * *
Basis Set Effects and the Choice of Reference Geometry in Ab Initio Calculations of Vibrational Spectra,
AD-A199 238 * * *
- *WICHELS, H. H. e e e e * * *
Theoretical Studies of Kinetic Mechanisms of Negative Ion Formation in Plasmas,
AD-A199 894 * * *
- *MILES, RICHARD B. e * * *
Development and Application of Oxygen Flow Tagging for Velocity Measurements and Flow Visualization in Turbulent Three-Dimensional Supersonic Flows,
AD-A200 119 * * *
- *WINARDI, J. E * * *
Interface Stability between Two Gas Streams of Different Density in a Curved Flow,
AD-A199 874 * * *
- *MITCHELL, J. B. e e e * * *
Merged Beam Studies of the Dissociative Recombination of H3(+) and H2(+),
AD-A200 526 * * *
- *WITCHNER, M * * *
Fundamental Processes in Partially Ionized Plasmas,
AD-A198 627 * * *
- *MITOMA, I * * *
Diffusion Equations in Duals of Nuclear Spaces,
AD-A200 078 * * *
- *MITOMA, I. e e * * *
A Langevin-Type Stochastic Differential Equation on a Space of Generalized Functionals,
AD-A199 809 * * *
- *MITTELMANN, H. D. e * * *
On Continuation for Variational Inequalities,
AD-A200 212 * * *
- *MITTELMANN, HANS D * * *
Continuity of Closest Rank-p Approximations to Matrices,
AD-A200 213 * * *
- *MO, J. D * * *
Investigation of Phenomena of Discrete Wingtip Jets,
AD-A199 962 * * *
- *MUNK, PETER e e * * *
The Inverse Scattering Problem for Time-Harmonic Acoustic Waves in an Inhomogeneous Medium,
AD-A200 335 * * *
- *MONTANO, PEDRO A. e e e e e * * *
High Temperature Properties of Ceramic/Carbon Systems in an Oxidizing Environment,
AD-A200 254 * * *
- *MOORE-LEDE, W. C. e * * *
Pharmacological Resetting of the Circadian Sleep-Wake Cycle,
AD-A200 246 * * *
- *MORRE, D. J * * *

* * *
Early Phase Interactions of Toluene
with Membranes: A Structural and
Functional Evaluation.
AD-A200 549

*MORRIS, W. L. * * *
Integration of Statistical and
Physical Models of Short Fatigue
Crack Growth.
AD-A197 917

*MORROW, THOMAS J. * * *
Modulation of Thalamic
Somatosensory Neurons by Arousal
and Attention.
AD-A200 073

*MORSE, T. F. * * *
Optical Fiber Science and
Technology: Novel Fibers and Fiber
Sensors.
AD-A200 311

*MUKHERJEE, AMIYA K. * * *
High Temperature Mechanical Testing
Facilities.
AD-A200 565

*MUSGROVE, RUPERT J. * * *
Chemistry of Polynuclear Metal
Complexes with Bridging Carbene or
Carbyne Ligands. Part 75. Reactions
of Octacarbonyldicobalt with the
Salts (X)(W(triple bond
CR)(CO)2(eta 5-C2B9H9Me2)) (X =
NEt4 or PPh4; R = Me, Ph, C6H4Me-2
or C6H4Me-4); Crystal Structure of
(PPh4)(Co2W(mu sub 3-CPh)(CO)8(eta
5-C2B9H9Me2)). O.5CH2Cl2.
AD-A200 065

* * *
Chemistry of Polynuclear Metal
Complexes with Bridging Carbene or
Carbyne Ligands. Part 74. Salts of
the Anions (W(triple bond CR)(CO)2

(Eta(5)-C2B9H9Me2))-(R=C6H4Me-2
C6H3Me2-2,6) as Reagents for the
Synthesis of Compounds with
Heteronuclear Metal-Metal Bonds:
Crystal Structure of (N(Et)4)-
(Fe(mu-C6H3Me2-2,6)(CO)5(Eta(5)-
C2B9H9Me2)).
AD-A200 218

*MYKKELTVEIT, SVEIN * * *
Development and Evaluation of a New
Regional Seismic Array in
Fennoscandia.
AD-A199 881

*NAAMAN, A. E. * * *
Non Contacting Evaluation of
Strains and Cracking Using Optical
and Infrared Imaging Techniques.
AD-A200 397

*NAGIB, HASSAN * * *
Equipment to Upgrade the Facilities
of the IIT (Illinois Institute of
Technology) Fluid Dynamics Research
Center.
AD-A198 084

*NAGIB, HASSAN M. * * *
Management and Control of Unsteady
and Turbulent Flows.
AD-A198 091

* * *
The National Diagnostic Facility
under Construction.
AD-A198 901

* * *
Management and Control of
Separation by Unsteady and Vortical
Flows.
AD-A198 902

*NAGL, ANTE * * *
Structure of a Bis(eta4-exocyclic-
1,3-diene)Fe(CO)3 Complex.
AD-A198 319

*NAM, KWANGHEE * * *
A Model Reference Adaptive Control
Scheme for Pure-Feedback Nonlinear
Systems.
AD-A198 386

*NANDAGOPALAN, S. * * *
On Exceedance Point Processes for
Stationary Sequences under Mild
Oscillation Restrictions.
AD-A198 314

*NARDI, V. * * *
Mega-Amp Opening Switch with Nested
Electrodes/Pulsed Generator of Ion
and Ion Cluster Beams.
AD-A198 465

*NATARAJAN, SUBRA * * *
Optical Symbolic Processor for
Expert System Execution.
AD-A197 668

*NELSON, RANDALL J. * * *
Changes in Somatosensory
Responsiveness in Behaving
Primates.
AD-A198 792

*NEURGAONKAR, R. R. * * *
Research on Sputtering of
Ferroelectric Thin Films.
AD-A197 899

*NEWHOUSE, V. L. * * *
Research on the Statistics of Grain
Lattice Echoes and Their Use in
Grain Size Estimation and Grain
Echo Suppression.
AD-A199 811

*NG, L. * * *
Fragmentation of Molecular

- Adsorbates by Electron and Ion Bombardment: Methoxy Chemistry on Al(111).
AD-A198 728
- *NG, TANG-TATEEE
* * *
Small Strain Response of Random Arrays of Elastic Spheres Using a Nonlinear Distinct Element Procedure.
AD-A198 281
- *NICHOLLS, J. T
* * *
Electronic and Structural Studies of Carbon/Carbon Composites.
AD-A198 007
- *NIEMAN, EDWARD
* * *
The National Diagnostic Facility under Construction.
AD-A198 901
- *OCHOA, OZDEN O.EEE
* * *
Nonlinear Dynamic Responses of Composite Rotor Blades.
AD-A200 145
- *O'NEAL, H. E
* * *
Mechanism of the Thermal Decomposition of Dimethylsilane at Atmospheric Pressures in the Gas Phase.
AD-A200 197
- *OSTERYOUNG, R. A.EEEE
* * *
Aspects of the Chemistry of Water in Ambient-Temperature Chloroaluminate Ionic Liquids: 170 NMR Studies.
AD-A198 225
- The Chemistry of Water in Ambient-Temperature Chloroaluminate Ionic Liquids: NMR Studies.
AD-A198 324
- *OSTERYOUNG, R. A.EEE
* * *
Formation and Electrochemistry of Polyfluorene in Ambient Temperature Ionic Liquids.
AD-A198 383
- *OSTERYOUNG, R. A.E
* * *
Simultaneous EPR (Electron Paramagnetic Resonance) Electrochemical Measurements on Polyfluorene in Ambient Temperature Ionic Liquids.
AD-A198 137
- Simultaneous EPR (Electron Paramagnetic Resonance) Electrochemical Measurements on Polypyrrole in Ambient Temperature Ionic Liquids.
AD-A198 323
- *OSTERYOUNG, ROBERT A.EEE
* * *
Removal of Protons from Ambient-Temperature Chloroaluminate Ionic Liquids.
AD-A198 451
- *OSTERYOUNG, ROBERT A.EEE
* * *
Electrochemistry of Polythiophene and Polybithiophene Films in Ambient Temperature Molten Salts.
AD-A198 565
- *OSTERYOUNG, ROBERT A.E
* * *
Electrochemistry of Molybdenum Chloride Dimers in a Basic Ambient-Temperature Molten Salt.
AD-A198 562
- *OUDARD, J. F
* * *
Simultaneous EPR (Electron Paramagnetic Resonance) Electrochemical Measurements on Polyfluorene in Ambient Temperature Ionic Liquids.
AD-A198 137
- Simultaneous EPR (Electron Paramagnetic Resonance) Electrochemical Measurements on Polypyrrole in Ambient Temperature Ionic Liquids.
AD-A198 323
- *OZEKICI, S.EEEE
* * *
Reliability of Complex Devices in Random Environments.
AD-A198 558
- *PACZKOWSKI, MARK A
* * *
Use of Electron Spin Resonance Spectroscopy to Study the Photochemistry of Adsorbed Dibenzyl Ketone on Porous Silica.
AD-A198 220
- *PAGE, RICHARD A
* * *
Study of High Temperature Failure Mechanisms in Ceramics.
AD-A198 375
- *PAIVARINTA, LASSIE
* * *
Far Field Patterns and the Inverse Scattering Problem for Electromagnetic Waves in an Inhomogeneous Medium.
AD-A200 223
- *PAN, XIONG
* * *
Photochemical Disproportionation Reactions of the W₂(CO)₁₀(2-) and Fe₂(CO)₈(2-) Complexes.
AD-A197 900

PERSONAL AUTHOR INDEX-25
UNCLASSIFIED EVJ00F

NG, -PAN

UNCLASSIFIED

- Photochemistry of Organometallic Halide Complexes. Mechanisms for the Formation of Ionic Products.
AD-A198 488
- *PAPANTONI-KAZAKOS, P * * *
Robust Algorithms for Detecting a Change in a Stochastic Process with Infinite Memory.
AD-A198 290
- *PASTERNAK, TATIANA * * *
New Insights on Visual Cortex. Abstracts. Center for Visual Science Symposium (18th) Held in Rochester, New York on June 18-18, 1988.
AD-A199 828
- *PATTON, WALDO * * *
Alfven Waves in a Cold Plasma with Curved Magnetic Fields.
AD-A200 312
- *PAUL, PHILLIP H * * *
Digital Imaging of Laser-Ignited Combustion.
AD-A200 329
- *PAMULA, R. F. * * *
Level Crossings of Filtered Dichotomous Noise.
AD-A198 188
- *PECK, S. K * * *
Collisional-Induced Absorption in Calcium Rare-Gas Collisions.
AD-A199 831
- *PEDERSEN, J. C. * * *
Electromagnetic Cross Sections of Conductive Fibers: Modified Drude Equations and Dependence of Dielectric Constant on Particle

- Size.
AD-A199 873
- *PEDERSEN, N. E * * *
Electromagnetic Cross Sections of Conductive Fibers: Modified Drude Equations and Dependence of Dielectric Constant on Particle Size.
AD-A199 873
- *PEREZ-ABREU, V. * * *
Stochastic Evolution Equations Driven by Nuclear-Space-Valued Martingales.
AD-A200 338
- *PETRAKIS, EMMANUEL * * *
Small Strain Response of Random Arrays of Elastic Spheres Using a Nonlinear Distinct Element Procedure.
AD-A198 281
- *PFEIFER, D. * * *
On the Distance between Mixed Poisson and Poisson Distribution.
AD-A198 369
- * * *
On a Joint Strong Approximation Theorem for Record and Inter-Record Times.
AD-A198 370
- *PFEIFER, DIETMAR * * *
A Martingale Characterization of Mixed Poisson Processes.
AD-A198 022
- *PHILBIN, CECELIA E * * *
Photochemistry of Organometallic Halide Complexes. Mechanisms for the Formation of Ionic Products.
AD-A198 488

- *PICHLER, G * * *
Electronic Assignments of the Violet Bands of Sodium.
AD-A198 839
- *PIMENTEL, GEORGE C. * * *
Transient Behaviors in Chemical Reactions: Nanosecond Infrared Spectroscopy, Chemically Pumped Visible and Near-IR Lasers.
AD-A198 484
- *PLATEW, E. * * *
On a Wide Range Exclusion Process in Random Medium with Local Jump Intensity.
AD-A200 510
- *POPE, S. B. * * *
An Examination of Forcing in Direct Numerical Simulations of Turbulence.
AD-A198 278
- *POPE, S. B. * * *
The Evolution of Surfaces in Turbulence.
AD-A198 368
- *POST, MICHAEL E. * * *
Surface Thermometry of Energetic Materials by Laser-Induced Fluorescence.
AD-A198 084
- *POURAHMADI, MOHSEN * * *
Degenerate Multivariate Stationary Processes: Basicity, Past and Future, and Autoregressive Representation.
AD-A199 929
- *PRAKASH, MANJU * * *

PERSONAL AUTHOR INDEX-28
UNCLASSIFIED EVJ00F

PAP-PRA

Alfven Waves in a Cold Plasma with
Curved Magnetic Fields.
AD-A200 312

*PRASAD, P. N. e e e e e

Monolayer and Langmuir-Blodgett
Multilayer Surface and Spectral
Studies of Poly-3-BCMJ.
AD-A198 601

*PRASAD, PARAS N. e e

Third-Order Nonlinear Optical
Effects in Organic Polymeric Films.
AD-A198 384

*PRENDERGAST, K. e e e e

Massive Symbolic Mathematical
Computations and Their
Applications.
AD-A200 253

*QUINN, JARUS W

Proceedings of the Topical Meeting
on the Microphysics of Surfaces,
Beams, and Adsorbates (2nd) Held in
Santa Fe, New Mexico on 18-18
February 1987.
AD-A197 801

*QUINN, JARUS W. e e e

Topical Meeting on Optics in
Adverse Environments: Summaries of
Papers Presented at the Optics in
Adverse Environments Topical
Meeting Held in Albuquerque, New
Mexico on 11-12 February 1987.
Technical Digest Series, Volume 8.
AD-A197 119

*RABEDNY, H. M. e e

Thermodynamically Reversible Uptake
of Electrically Active Dopants in
Conducting Polymers: Iodine in
Polythiophene.
AD-A198 378

*RABINOWITZ, P. H. e e

Some Problems in Nonlinear
Analysis.
AD-A198 810

*RAFF, LIONEL M

Dynamics of
Chemisorption/Scattering of Atomic
Hydrogen on Partially Covered
Si(111) Surfaces.
AD-A198 297

*RAFF, LIONEL M. e e e e e

Computational Studies of SiH₂+SiH₂
Recombination Reaction Dynamics on
a Global Potential Surface Fitted
to Ab Initio and Experimental Data.
AD-A198 377

*RAFF, LIONEL M. e e e e e

Trajectory Studies of Unimolecular
Reactions of Si₂H₄ and SiH₂ on a
Global Potential Surface Fitted to
Ab Initio and Experimental Data.
AD-A200 369

*RAGHUPATHY, RAMANATHAN

Validation and Application of
Pharmacokinetic Models for
Interspecies Extrapolations in
Toxicity Risk Assessments of
Volatile Organics.
AD-A200 034

*RAU, RISHI e e e e e

Bonding at Metal-Ceramic Interfaces
in Hybrid Materials.
AD-A197 928

*RAUPUT, BALRAM S. e

*RAO, C. R. e e

Remarks on the Positivity of
Densities of Stable Probability
Measure on R(d).
AD-A197 820

*RAO, C. R. e e

Linear Transformations, Projection
Operators and Generalized Inverses;
A Geometric Approach.
AD-A197 808

*RAVEENDRA, S. T

Advanced Modeling for Fatigue
Growth of Small Surface Cracks.
AD-A198 077

*REDEKOPP, LARRY G. e e e

Studies of Unsteadiness in Boundary
Layers.
AD-A189 989

*REDINGTON, RICHARD L

Laser Fluorescence Excitation
Spectrum of Jet-Cooled Tropolone:
The A(1) B sub 2 - X(1) A sub 1
System.
AD-A199 730

*REGAN, DAVID e e

Visual Sensitivities and
Discriminations and Their Roles in
Aviation.
AD-A198 470

*REISENTHAL, PATRICK H

Management and Control of Unsteady
and Turbulent Flows.
AD-A198 091

*REISENTHAL, PATRICK H

Management and Control of
Separation by Unsteady and Vortical

UNCLASSIFIED

Flows.
AD-A198 902

*REISS, H

* * *
Absorption of Gaseous Iodine by
Polythiophene Films and Powders,
AD-A198 218

* * *
Thermodynamically Reversible Uptake
of Electrically Active Dopants in
Conducting Polymers: Iodine in
Polythiophene,
AD-A198 378

* * *
Holes, Electrons, Polarons, and
Bipolarons and the Thermodynamics
of Electrically Active Dopants in
Conducting Polymers,
AD-A198 402

*REITER, E. R. ee

* * *
Urban Climate Effects of Energy
Demand for Space Heating,
AD-A200 333

*RESTER, ALFRED C., JR

* * *
Shuttle Flight Test of an Advanced
Gamma-Ray Detection System.
AD-A198 399

*RHODE, D. L. ee

* * *
The Measurement and Prediction of
Rotordynamic Forces for Labyrinth
Seals.
AD-A197 185

*RHODES, C. G. ee

* * *
Processability and High Temperature
Behavior of Emerging Aerospace
Alloys.
AD-A199 928

*RIBAUDO, C

* * *
Thermal Analysis System (DSC, TGA,
TMA) for Oxidation and Phase

Transformation Studies of Alloys
with Metastable Phase.
AD-A198 420

*RICE, BETSY M

* * *
Dynamics of
Chemisorption/Scattering of Atomic
Hydrogen on Partially Covered
Si(111) Surfaces,
AD-A198 297

* * *
Diffusion of H Atoms on a Si(111)
Surface with Partial Hydrogen
Coverage: Monte Carlo Variational
Phase-Space Theory with Tunneling
Correction,
AD-A198 328

*RICE, JOHN R. ee ee

* * *
Parallel Algorithms for PDE
solvers.
AD-A199 825

*RIGDY, D

* * *
Constitutive Modelling of Joints
under Cyclic Loading. Part 1.
Modelling and Testing of Idealized
Rock Joints.
AD-A200 232

*RING, M. A. ee ee

* * *
Mechanism of the Thermal
Decomposition of Dimethylsilane at
Atmospheric Pressures in the Gas
Phase.
AD-A200 197

*ROSE, TODD S

* * *
Femtosecond Real-Time Observation
of Wave Packet Oscillations
(Resonance) in Dissociation
Reactions,
AD-A197 717

* * *

Femtosecond Real-Time Dynamics of
Photofragment-Trapping Resonances

on Dissociative Potential Energy
Surfaces,
AD-A198 020

*ROSKER, MARK J

* * *
Femtosecond Real-Time Observation
of Wave Packet Oscillations
(Resonance) in Dissociation
Reactions,
AD-A197 717

* * *

Femtosecond Real-Time Dynamics of
Photofragment-Trapping Resonances
on Dissociative Potential Energy
Surfaces.
AD-A198 020

*ROSS, JOHN

* * *
Spectroscopic and Light Scattering
Instrumentation Proposal.
AD-A199 991

*ROWE, WILLIAM S

* * *
Coupling Linearized Far-Field
Boundary Conditions with Nonlinear
Near-Field Solutions in Transonic
Flow.
AD-A198 721

*RUDOLPH, H

* * *
(2+1) REMPI (Resonant-Enhanced
Multiphoton Ionization) of NO via D
2 Sigma(+) State: Rotational
Branching Ratios.
AD-A198 134

* * *

Ionic Rotational Branching Ratios
in Resonant Enhanced Multiphoton
Ionization of NO via the A 2Sigma +
(3s sigma) and D 2Sigma + (3p
sigma) States,
AD-A198 330

* * *

(1+1) Resonant Enhanced Multiphoton
Ionization via the A 2 Sigma +
State of NO: Ionic Rotational
Branching Ratios and Their

PERSONAL AUTHOR INDEX-28
UNCLASSIFIED EVJ00F

REI-RUD

Intensity Dependence,
AD-A198 453

*RUIZ, JAMES M.***

Mechanism of the 1,5-Sigmatropic
Hydrogen Shift in 1,3-Pentadiene,
AD-A200 194

*RUPPERT, DAVID***

Discussion of Box's 1987 Article in
Technometrics.

AD-A199 823

A Note on Computing Robust
Regression Estimates Via
Iteratively Reweighted Least
Squares.

AD-A200 161

*SACKS, J

A Quick and Easy Multiple Use
Calibration Curve Procedure.

AD-A198 227

*SAHU, D

Coupled s-Wave and d-Wave States in
the Heavy Fermion Superconductor U
sub 1-x Th sub x Be sub 13.

AD-A197 124

*SAKYA, R. M

Electronic and Structural Studies
of Carbon/Carbon Composites.

AD-A198 007

*SALAITA, GHALEB N

Characterization of Hydroquinone
and Related Compounds Adsorbed at
Pt(111) from Aqueous Solutions:
Electron Energy-Loss Spectroscopy,
Auger Spectroscopy, Low Energy
Electron Diffraction, and Cyclic
Voltammetry.

AD-A197 715

Studies of L-DOPA and Related
Compounds Adsorbed from Aqueous
Solutions at Pt(100) and Pt(111):
Electron Energy-Loss Spectroscopy,
Auger Spectroscopy, and
Electrochemistry.
AD-A198 501

*SAMARANAYAKE, V.A

A Confidence Interval for Treatment
Component-of-Variance With
Applications to Differences in
Means of Two Exponential
Distributions.

AD-A200 540

*SAMORODNITSKY, GENMADY***

Tail Behaviour for the Suprema of
Gaussian Processes with
Applications to Empirical
Processes.

AD-A200 511

*SANDHU, RANBIR S

Cumulative Damage Modelling in
Composite Laminates.

AD-A198 282

*SANDO, K. M

Electronic Assignments of the
Violet Bands of Sodium.

AD-A199 839

*SANDU, RANBIR S

Motion and Stability of Saturated
Soil Systems Under Dynamic Loading.

AD-A200 293

*SATYANARAYANA, N

Transannular Cyclizations in the
Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,
9)undecane-8,11-Dione System: A
reinvestigation.

AD-A198 026

Reductive Amination of
Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,
9)undecane-8,11-dione,
AD-A198 222

*SCHAAD, L. J

Basis Set Effects and the Choice of
Reference Geometry in Ab Initio
Calculations of Vibrational
Spectra.

AD-A189 238

*SCHAEFER, HENRY F., III***

Fundamental Studies of Carbon, NH,
and Oxygen Rings and Other High
Energy Density Molecular Systems.

AD-A200 331

*SCHATZ, G. C.***

State-Selective Studies of T Yields
R, V Energy Transfer: The H + CO
system.

AD-A198 373

*SCHELL, MARK A

Spectroscopic and Light Scattering
Instrumentation Proposal.

AD-A199 991

*SCHERER, GEORGE J

Laser Fluorescence Excitation
Spectrum of Jet-Cooled Tropolone:
The A(1) B sub 2 - X(1) A sub 1
System.

AD-A199 730

*SCHIEDT, W.A

UVV Transport System for Laser
Irradiation Studies.

AD-A200 330

*SE, KAZUNORI

Rheological, Rheo-Optical and Light
Scattering Studies on Nematic

UNCLASSIFIED

- Solutions of Poly(1,4-Phenylene-2,6-Benzobisthiazole),
AD-A198 380 * * *
- Nematic Solutions of Rodlike Polymers Light Scattering from Nematic Solutions with Complex Texture and Phase Separation in Poor Solvents,
AD-A198 454 * * *
- Frank Elastic Constants and Leslie-Ericksen Viscosity Coefficients of Nematic Solutions of a Rodlike Polymer,
AD-A198 461 * * *
- *SEITZMAN, JERRY M * * *
Digital Imaging of Laser-Ignited Combustion,
AD-A200 328
- *SEKIGUCHI, AKIRA * * *
A New Route to 1,4-Distilbenzenes and 1,4-Distilbarrelenes,
AD-A200 207
- *SELF, S. A. eeee * * *
Fundamental Processes in Partially Ionized Plasmas,
AD-A198 627
- *SESSLER, FRANCIS M * * *
Electrophysiological Actions of Norepinephrine in Rat Lateral Hypothalamus. I. Norepinephrine Induced Modulation of LH Neuronal Responsiveness to Afferent Synaptic Inputs and Putative Neurotransmitters
AD-A198 189
- *SHAH, D. W * * *
Fundamental Understanding of the Intrinsic Ductility in Nickel-Base L1 sub 2 Type Alloys.

- AD-A197 805
- *SHAKED, MOSHE * * *
On Lifetimes Influenced by a Common Environment,
AD-A198 273
- *SHANTHIKUMAR, J. G. eee * * *
On Lifetimes Influenced by a Common Environment,
AD-A198 273
- *SHEAFFER, J. D * * *
Urban Climate Effects of Energy Demand for Space Heating,
AD-A200 333
- *SHEALY, J. R * * *
Compound Semiconductor Materials, Devices and Circuits,
AD-A197 640
- *SHEN, S. F. e * * *
Unsteady Viscous Flows Over Moving Body,
AD-A200 269
- *SHER, A * * *
Semiconductor Alloy Engineering for High-Speed Devices,
AD-A200 356
- *SHERWOOD, PAUL * * *
Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 75. Reactions of Octacarbonyldicobalt with the Salts (X)(W(triple bond CR))(CO)2(eta 5-C2B9H9Me2)) (X = NEt4 or PPh4; R = Me, Ph, C6H4Me-2 or C6H4Me-4); Crystal Structure of (PPh4)(Co2W(mu sub 3-CPh)(CO)8(eta 5-C2B9H9Me2)) 0.5CH2Cl2,
AD-A200 065
- Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 74. Salts of the Anions (W(Triple Bond CR)(CO)2(eta 5-C2B9H9Me2))-(R=C6H4Me-2 C6H3Me2-2,6) as Reagents for the Synthesis of Compounds with Heteronuclear Metal-Metal Bonds: Crystal Structure of (Ni(eta 4)-(Fe(mu-C6H3Me2-2,6)(CO)5(eta 5-C2B9H9Me2))),
AD-A200 218
- *SHI, Z * * *
Investigation of Phenomena of Discrete Wingtip Jets,
AD-A198 962
- *SHIER, D. R * * *
A New Algorithm for Performance Analysis of Communication Systems,
AD-A197 790
- *SHINIMOTO, RONALD * * *
Diels-Alder Reactions of 1,1-dimethyl-2,3,4,5-tetraphenyl-1-silacyclopentadiene, 1,1-dimethyl-2,5-diphenyl-1-silacyclopentadiene and 1,1-dimethyl-3,4-diphenyl-1-silacyclopentadiene with Maleic Anhydride; Kinetic Measurements,
AD-A200 365
- *SHIUE, WEI-KEI * * *
Test of Equal Gamma-Distribution Means with Unknown and Unequal Shape Parameters,
AD-A200 368
- *SHOFNER, WILLIAM P. eeeee * * *
Information Processing of Complex Sounds in the Anteroventral Cochlear Nucleus.
AD-A198 576

PERSONAL AUTHOR INDEX-30
UNCLASSIFIED EVJ00F

SEI-SHC

- *STERAKOWSKI, ROBERT L * * *
Cumulative Damage Modeling in
Composite Laminates.
AD-A198 282
- *SILAVVE, NED D * * *
Photochemical Disproportionation
Reactions of the W₂(CO)₁₀(2-) and
Fe₂(CO)₈(2-) Complexes,
AD-A197 900
- *SIRCAR, S * * *
Thermal Analysis System (DSC, TGA,
TMA) for Oxidation and Phase
Transformation Studies of Alloys
with Metastable Phase.
AD-A198 420
- *SIVAKUMAR, N * * *
Vector Correlations in the
Photodissociation of CH₃CO, OCS, and
Glyoxal,
AD-A198 332
- *SKOROCK, M. P * * *
Interface Stability between Two Gas
Streams of Different Density in a
Curved Flow.
AD-A199 874
- *SMITH, L. M * * *
Abel Inversion Using Transform
Techniques.
AD-A199 238
- *SMITH, RICHARD L. e * * *
A Counterexample Concerning the
External Index.
AD-A200 078
- *SMITH, W. e * * *
Variance Functions and the Minimum
Detectable Concentration in Assays.
- AD-A200 203
- *SNOW, D. B * * *
Dispersion Strengthening of High
Temperature Niobium Alloys.
AD-A198 958
- *SONTAG, EDUARDO D * * *
Nonlinear Discrete-Time Systems:
Algebraic Theory.
AD-A197 821
- *SPAIN, IAN L * * *
Sub-Micron Carbon Filaments for
Optical Applications.
AD-A198 878
- *SPECK, J. S * * *
Electronic and Structural Studies
of Carbon/Carbon Composites.
AD-A198 007
- *SPIEGELMAN, C. H * * *
A Quick and Easy Multiple Use
Calibration Curve Procedure.
AD-A198 227
- *SRINIVASA, MURALIDHARAE * * *
Validation and Application of
Pharmacokinetic Models for
Interspecies Extrapolations in
Toxicity Risk Assessments of
Volatile Organics.
AD-A200 034
- *SRINIVASARAO, MOHAN * * *
Rheological, Rheo-Optical and Light
Scattering Studies on Nematic
Solutions of Poly(1,4-Phenylene-2,6-
Benzobisthiazole),
AD-A198 380
- *STARK, LOUISE * * *
AD-A198 380
- A 3-D Object Recognition System
Using Aspect Graphs.
AD-A198 472
- *STEFANSKI, LEONARD A * * *
Conditional Scores and Optimal
Scores for Generalized Linear
Measurement-Error Models.
AD-A198 379
- *STEIER, WILLIAM H * * *
Joint Service Electronics Program:
Research in Electronics.
AD-A199 859
- *STEPHENS, J. A * * *
Photoionization of the Valence
Orbitals of OH,
AD-A198 331
- *STERN, DONALD A * * *
Characterization of Hydroquinone
and Related Compounds Adsorbed at
Pt(111) from Aqueous Solutions:
Electron Energy-Loss Spectroscopy,
Auger Spectroscopy, Low Energy
Electron Diffraction, and Cyclic
Voltammetry.
AD-A197 715
- *STUDIES OF L-DOPA and Related
Compounds Adsorbed from Aqueous
Solutions at Pt(100) and Pt(111):
Electron Energy-Loss Spectroscopy,
Auger Spectroscopy, and
Electrochemistry.
AD-A198 501
- *STEVENS, J * * *
Intermolecular Interactions and
Crystal Stabilities of
Tetrathiafulvalene-
tetracyanoquinodimethane,
AD-A200 361
- *STEVENS, J. e * * *

UNCLASSIFIED

- * * *
Polymeric Heterostructure Thin
Films,
AD-A200 363
- *STEVENSON, D. A. * * *
Crystal Growth and Mechanical
Properties of Semiconductor Alloys.
AD-A198 153
- *STEWAN, JOHN * * *
A 3-D Object Recognition System
Using Aspect Graphs.
AD-A198 472
- *STONE, F. G. * * *
Chemistry of Polynuclear Metal
Complexes with Bridging Carbene or
Carbyne Ligands. Part 75. Reactions
of Octacarbonyldicobalt with the
Salts (X)(W(triple bond
CR)(CO)2(eta 5-C2B9H9Me2)) (X =
Me4 or PPh4; R = Me, Ph, C6H4Me-2
or C6H4Me-4); Crystal Structure of
(PPh4)(Co2W(mu sub 3-CPh)(CO)8(eta
5-C2B9H9Me2)). O.5CH2Cl2.
AD-A200 065
- * * *
Chemistry of Polynuclear Metal
Complexes with Bridging Carbene or
Carbyne Ligands. Part 74. Salts of
the Anions (W(Triple Bond CR)(CO)2
(Eta(5)-C2B9H9Me2))-(R=C6H4Me-2
C6H3Me2-2,6) as Reagents for the
Synthesis of Compounds with
Heteronuclear Metal-Metal Bonds:
Crystal Structure of (N(Et)4)-
(FeW(mu-C6H3Me2-2,6)(CO)5(Eta(5)-
C2B9H9Me2)).
AD-A200 218
- *STREET, JAMES O * * *
A Note on Computing Robust
Regression Estimates via
Iteratively Reweighted Least
Squares.
AD-A200 161

- *STRINGFELLOW, GERALD B. * * *
Use of D2 to Elucidate OMVPE
(organometallic Vapor Phase
Epitaxial) Growth Mechanisms.
AD-A199 841
- *STURTEVANT, BRADFORD * * *
Investigations of the Motion of
Discrete-Velocity Gases by Cellular
Automata.
AD-A200 221
- *STWALLEY, W. C. * * *
Electronic Assignments of the
Violet Bands of Sodium,
AD-A199 839
- *SUBRAMANIAN, R. * * *
Thermal Analysis System (DSC, TGA,
TMA) for Oxidation and Phase
Transformation Studies of Alloys
with Metastable Phase.
AD-A198 420
- *SUBRAMONY, V * * *
Single Crystal GaAs Stoichiometry
Measurements Through Double Crystal
Diffractionometry.
AD-B126 593L
- *SUDHARSANAN, S. I. * * *
Abel Inversion Using Transform
Techniques.
AD-A198 238
- *SUDOU, ATSUSI * * *
Intercalation and Electrical
Properties of Highly Ordered
Graphite Fibers.
AD-A198 508
- *SUGIHARA, KOE * * *
Lattice Vibrations in Thin-Film

- Carbon: Electron-Rayleigh-Wave
Interaction,
AD-A198 289
- *SULLIVAN, V * * *
Rheological Studies on Blends of
Rodlike and Flexible Chain
Polymers,
AD-A198 455
- *SYRETT, W. J. * * *
Long Term Studies of the Refractive
Index Structure Parameter in the
Troposphere and Stratosphere.
AD-A198 313
- *SZABO, A * * *
Electron Stimulated Desorption from
CO Chemisorbed on Pt(111): A
dynamical Study of Positive Ion and
Metastable CO Emission,
AD-A199 729
- *TALVACCHIO, J. * * *
Superconducting Electronic Film
Structures.
AD-A200 534
- *TASKER, P. J * * *
Compound Semiconductor Materials,
Devices and Circuits.
AD-A197 840
- *THOMAS, J. W * * *
Microstructure and Properties of
Catalysts Symposium Held in Boston,
Massachusetts on November 30-
December 3, 1987. Materials
Research Society Symposium
Proceedings. Volume 111.
AD-A197 253
- *THOMPSON, A. W * * *
Fundamentals of Interfacial

PERSONAL AUTHOR INDEX-32
UNCLASSIFIED EVJ00F

STE-THO

Strength in Composite Materials.
AD-A198 626

*THOMPSON, DONALD L. * * *

Computational Studies of SiH₂+SiH₂ Recombination Reaction Dynamics on a Global Potential Surface Fitted to Ab Initio and Experimental Data, AD-A198 377

Trajectory Studies of Unimolecular Reactions of SiH₄ and SiH₂ on a Global Potential Surface Fitted to Ab Initio and Experimental Data, AD-A200 369

*THOMPSON, DONALD L. * * *

Dynamics of Chemisorption/Scattering of Atomic Hydrogen on Partially Covered Si(111) Surfaces, AD-A198 297

Diffusion of H Atoms on a Si(111) Surface with Partial Hydrogen Coverage: Monte Carlo Variational Phase-Space Theory with Tunneling Correction, AD-A198 326

*THOMSON, D. W. * * *

Long Term Studies of the Refractive Index Structure Parameter in the Troposphere and Stratosphere, AD-A198 313

*TILLEY, T. D. * * *

The Reactivity of Transition Metal-Silicon Compounds, AD-A200 371

*TOLK, NORMAN H. * * *

Electronic Interactions of Electrons, Photons, and Atoms with Material Surfaces, AD-A198 626

*TRAHANOVSKY, W. S. * * *

Photochemistry of Benzocyclobutene, AD-A198 507

*TREACY, W. M. * * *

Microstructure and Properties of Catalysts Symposium Held in Boston, Massachusetts on November 30-December 3, 1987, Materials Research Society Symposium Proceedings, Volume 111, AD-A197 253

*TREISTMAN, STEVEN N. * * *

Regulation of Voltage-Dependent Channel Function, AD-A200 375

*TRIPATHY, SUKANT K. * * *

Organic and Polymeric Nonlinear Optical Materials: a Topical Workshop Held in Virginia Beach, Virginia on May 16-19, 1988, AD-A198 305

*TSAI, CHEN S. * * *

Integrated Acoustooptic Device Modules for Optical Information Processing, AD-A198 061

*TUREK, FRED W. * * *

Society for Research on Biological Rhythms (1st) Held on May 11-14, 1988 in Charleston, South Carolina, AD-A200 134

*TURLEY, R. S. * * *

Ionization Rates Relevant to Laser Cooling of Hydrogen, AD-A198 481

*TURRO, N. J. * * *

Photochemistry of Benzocyclobutene, AD-A198 507

*TURRO, NICHOLAS J. * * *

Use of Electron Spin Resonance Spectroscopy to Study the Photochemistry of Adsorbed Dibenzyl Ketone on Porous Silica, AD-A198 220

*TURRO, NICHOLAS J. * * *

Size, Shape and Site Selectivities in the Photochemical Reactions of Molecules Adsorbed on Pentasil Zeolites, AD-A197 758

*TYLER, D. R. * * *

Photochemical Generation of Nineeen-Electron Organometallic Complexes and Their Use as Reducing Agents in Micellar Systems, AD-A197 885

*TYLER, DAVID * * *

Powerful Photogenerated Reducing Agents, AD-A197 849

*TYLER, DAVID R. * * *

Photochemical Disproportionation Reactions of the W₂(CO)₁₀(2-) and Fe₂(CO)₈(2-) Complexes, AD-A197 900

*TYLER, DAVID R. * * *

Photochemistry of Organometallic Halide Complexes. Mechanisms for the Formation of Ionic Products, AD-A198 488

*UHLWANN, D. R. * * *

Ceramics Derived from Organometallic Polymers.

UNCLASSIFIED

AD-A200 118

*URAM, K. J. ©

Observation of Molecular Rotors on Surfaces by ESDIAD (Electron Stimulated Desorption Ion Angular Distribution): Studies of PF_3 and NH_3 Chemisorption on Ni Surfaces, AD-A198 505

*URIBE, FRANCISCO A

Electrochemical and Spectroscopic Studies of 1,4-Benzquinone in Ambient Temperature Chloroaluminate Ionic Liquids, AD-A198 558

*UTIKAL, KLAUS J

Identifying Nonlinear Covariate Effects in Semimartingale Regression Models, AD-A197 323

*VAKILI, A. D

Investigation of Phenomena of Discrete Wingtip Jets, AD-A198 982

*VAN SMAALEN, SANDER

Theory of Laser-Pulse-Induced Molecular Dynamics: Gas-Phase Molecular Collisions and Adbond Dynamics, AD-A197 871

*VAN WAZER, JOHN R. ©

An Ab Initio Study of the Structure and Bonding of Pralidoxime and Its Conjugate Base, AD-A200 532

*VOELKEL, A. ©©©©

Fundamentals of Interfacial Strength in Composite Materials.

AD-A198 628

*VON OHAIN, HANS

Interface Stability between Two Gas Streams of Different Density in a Curved Flow, AD-A198 874

*VULLIET, P. R. ©©©©

Biochemical Mechanisms controlling Bioreactivity of Adrenal Chromaffin Cells, AD-A198 471

*WAGNER, R. A. ©©©©©

A New Process for Final Densification of Ceramics, AD-A199 959

*WALKER, BRUCE K

Approximate Evaluation of Reliability and Availability Via Perturbation Analysis, AD-A198 940

*WANG, J. ©

High Pulsed Power, Self Excited Magneto-hydrodynamic Power Generation Systems, AD-A200 258

*WANG, JINFENG

Dynamics of Interaction between a 1,9-Biradical and Lanthanide Ions, AD-A198 088

*WARK, CANDACE E. ©©©©©

Management and Control of Unsteady and Turbulent Flows, AD-A198 091

*WARREN, RICHARD M

Mechanisms Mediating the Perception

of Complex Acoustic Patterns.
AD-A200 530

*WATERHOUSE, BARRY D. ©©©©

The Role of Central Monoaminergic Systems in Arousal and Selective Attention, AD-A198 298

*WATERHOUSE, BARRY D. ©

Electrophysiological Actions of Norepinephrine in Rat Lateral Hypothalamus. I. Norepinephrine Induced Modulation of LH Neuronal Responsiveness to Afferent Synaptic Inputs and Putative Neurotransmitters, AD-A198 189

*WATERMAN, KENNETH C

Dynamics of Interaction between a 1,8-Biradical and Lanthanide Ions, AD-A198 068

Use of Electron Spin Resonance

Spectroscopy to Study the Photochemistry of Adsorbed Dibenzyl Ketone on Porous Silica, AD-A198 220

*WATERMAN, P. C

Electromagnetic Cross Sections of Conductive Fibers: Modified Drude Equations and Dependence of Dielectric Constant on Particle Size, AD-A199 873

*WATSON, W. H. ©©©

Transannular Cyclizations in the Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-dione System: A reinvestigation, AD-A198 026

*WATSON, WILLIAM H

PERSONAL AUTHOR INDEX-34
UNCLASSIFIED EVJ00F

URA-WAT

- * * *
- A Dimer Ketone Formed via $\text{Fe}(\text{CO})_5$ -Promoted Coupling of 7-Phenoxynorbornadiene to Carbon Monoxide.
AD-A197 884
- * * *
- Structure of a Bis(eta⁵-cyclopentadienyl)iron(II) Complex.
AD-A198 319
- *WAY, JOHN L * * *
- Equipment to Upgrade the Facilities of the IIT (Illinois Institute of Technology) Fluid Dynamics Research Center.
AD-A198 084
- * * *
- The National Diagnostic Facility under Construction.
AD-A198 901
- * * *
- Management and Control of Separation by Unsteady and Vortical Flows.
AD-A198 902
- *WEBER, WILLIAM P * * *
- Anionic Ring-Opening Polymerization of Sila- and Germacyclopentanes.
AD-A197 874
- * * *
- Diels-Alder Reactions of 1,1-dimethyl-2,3,4,5-tetraphenyl-1-silacyclopentadiene, 1,1-dimethyl-2,5-diphenyl-1-silacyclopentadiene and 1,1-dimethyl-3,4-diphenyl-1-silacyclopentadiene with Maleic Anhydride: Kinetic Measurements.
AD-A200 365
- *WEINER, JEANNE M. * * *
- Behavioral Consequences of Neurotransmitter Regulation.
AD-A200 374
- *WEINER, J. J. * * *
- * * *
- Diffusion at Interfaces: Microscopic Concepts. Proceedings of a Workshop Held in Campobello Island, Canada on August 18-22 1987. Springer Series in Surface Sciences. Volume 12.
AD-A197 759
- *WEINERT, HOWARD L * * *
- Fault Tolerant Parallel Implementations of Iterative Algorithms for Optimal Control Problems.
AD-A198 041
- *WELLNER, EDNA * * *
- Characterization of Hydroquinone and Related Compounds Adsorbed at Pt(111) from Aqueous Solutions: Electron Energy-Loss Spectroscopy, Auger Spectroscopy, Low Energy Electron Diffraction, and Cyclic Voltammetry.
AD-A197 715
- *WELSH, KEVIN M * * *
- Dynamics of Interaction between a 1,9-Biradical and Lanthanide Ions.
AD-A198 068
- * * *
- Use of Electron Spin Resonance Spectroscopy to Study the Photochemistry of Adsorbed Dibenzyl Ketone on Porous Silica.
AD-A198 220
- *WERELEY, NORMAN M. * * *
- Approximate Evaluation of Reliability and Availability Via Perturbation Analysis.
AD-A198 940
- *WERNER, HANS-JOACHIM * * *
- Energetics and Spin- and Lambda-Doublet Selectivity in the Infrared Multiphoton Dissociation $\text{HN}_3(\text{X } 1\text{A})$
- Yields $\text{N}_2(\text{X } 1 \text{ Sigma sub g}(+)) + \text{NH}(\text{X } 3 \text{ Sigma}(-)), \text{A } 1 \text{ Delta}$: Theory.
AD-A198 928
- *WERNER, JOHN S. * * *
- Conference on the Neurophysiological Foundations of Visual Perception.
AD-A198 407
- *WEST, ROBERT * * *
- A New Route to 1,4-Disilabenzenes and 1,4-Disilabarrelenes.
AD-A200 207
- *WHITE, J. W * * *
- Microstructure and Properties of Catalysts Symposium Held in Boston, Massachusetts on November 30-December 3, 1987. Materials Research Society Symposium Proceedings. Volume 111.
AD-A197 253
- *WHITE, M. G * * *
- Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (Resonantly Enhanced Multiphoton Ionization) of NO .
AD-A198 367
- *WHITEHEAD, J. C. * * *
- The Kinetics and Dynamics of Iodine Monofluoride Formation in Gas-Phase Collisions.
AD-A199 622
- *WILLIAMS, DAVID * * *
- Equipment to Upgrade the Facilities of the IIT (Illinois Institute of Technology) Fluid Dynamics Research Center.
AD-A198 084

PERSONAL AUTHOR INDEX-35
UNCLASSIFIED EVJ00F

WAY-WIL

UNCLASSIFIED

*WILLIAMS, DAVID R. * * *
Management and Control of
Separation by Unsteady and Vortical
Flows.
AD-A198 902

*WILLIAMS, ELLEN D * * *
Scanning Tunneling Microscopy as a
Surface Chemical Probe.
AD-A199 922

*WILLIAMSON, SAMUEL J. * * *
Perceptual Factors in Workload: A
neuromagnetic Study.
AD-A198 487

*WIMMER, E. * * *
Intermolecular Interactions and
Crystal Stabilities of
Tetrafluorvalene-
tetracyanoquinodimethane,
AD-A200 361

*WOLF, E. D * * *
Compound Semiconductor Materials,
Devices and Circuits.
AD-A197 840

*WOLFE, WILLIAM E * * *
Cumulative Damage Modelling in
Composite Laminates.
AD-A198 282

* * *
Motion and Stability of Saturated
Soil Systems Under Dynamic Loading.
AD-A200 283

*WOLPERT, R. L. * * *
Diffusion Equations in Duals of
Nuclear Spaces.
AD-A200 078

*WOODY, CHARLES D. * * *

Neurophysiological Research
Supporting the Investigation of
Adaptive Network Architectures.
AD-A198 878

*WU, F.-J * * *
Novel ((Diisopropylamino)triphosphin
e)hexacarbonyldiiron Complexes.
AD-A197 997

* * *
(Diethylamino)phosphorus Metal
Carbonyls. 5. Chemical Reactivity
of the Phosphorus-Bridging Carbonyl
Group in Carbonylbis((diisopropylam
ino)phosphido)hexacarbonyldiiron(1-
4).
AD-A198 327

* * *
Diethylamino Phosphorus Metal
Carbonyls. 8. Chemistry of
(Tris(diisopropylamino)triphosphine)
diiron Hexacarbonyl Derivatives
Including the Synthesis and
Structure of Tetrametallic
Derivatives 1-4.
AD-A198 581

* * *
Diethylamino Phosphorus Metal
Carbonyls. 4. Novel Phosphorus-
Bridging Carbonyl Derivatives and
Triphosphine Derivatives from
Reactions of Tetracarbonylferrate(-
II) with (Diethylamino)dichlorophosp
hines 1-4.
AD-A198 564

*WU, J. M * * *
Investigation of Phenomena of
Discrete Wingtip Jets.
AD-A199 982

*WU, W. K. * * *
Diethylamino Phosphorus Metal
Carbonyls. 1. Mononuclear
Derivatives from Reactions of
Bis(diisopropylamino)phosphine with
Metal Carbonyls.
AD-A198 563

*WU, YUEHUA * * *
Discrimination Analysis when the
Variates are Grouped and Observed
in Sequential Order.
AD-A198 405

*YAMANASHI, HIDENORI * * *
Intercalation and Electrical
Properties of Highly Ordered
Graphite Fibers.
AD-A198 508

*YATES, J. T., JR * * *
Electron Stimulated Desorption from
CO Chemisorbed on Pt(111): A
dynamical Study of Positive Ion and
Metastable CO Emission.
AD-A198 728

*YATES, J. T., JR * * *
DIET in the Second Layer: An ESDIAD
(Electron Stimulated Desorption Ion
Angular Distribution) Study of NH3
on a CO Layer on Ni(111) and
Ni(110).
AD-A197 870

*YATES, J. T., JR * * *
Fragmentation of Molecular
Adsorbates by Electron and Ion
Bombardment: Methoxy Chemistry on
Al(111).
AD-A198 728

*YATES, J. T., JR * * *
Observation of Molecular Rotors on
Surfaces by ESDIAD (Electron
Stimulated Desorption Ion Angular
Distribution): Studies of PF3 and
NH3 Chemisorption on Ni Surfaces.
AD-A198 505

*YOUNG, DAVID M., JR * * *
Optimum acceleration factors for

PERSONAL AUTHOR INDEX-36
UNCLASSIFIED EVJ00F

WIL-YOU

iterative solutions of linear and non-linear systems.
AD-A198 408

*YU, G. @

Propagation and Extinction of Stretched Premixed Flames.
AD-A198 450

*ZAUDERER, B

High Pulsed Power, Self Excited Magnetonhydrodynamic Power Generation Systems.
AD-A200 258

*ZAWODZINSKI, THOMAS A., JR

Aspects of the Chemistry of Water in Ambient-Temperature Chloroaluminate Ionic Liquids: 170 NMR Studies.
AD-A198 225

The Chemistry of Water in Ambient-Temperature Chloroaluminate Ionic Liquids: NMR Studies.
AD-A198 324

Removal of Protons from Ambient-Temperature Chloroaluminate Ionic Liquids.
AD-A198 451

*ZEKYZER, ANDREW S

Structural Assignment of a Methylcyclopentadiene-Toluquinone Diels-Alder Cycloadduct. Analysis of the Two-Dimensional NMR Spectrum of 1,8-Dimethyl-1 alpha, 4 alpha, 4a alpha, 5 alpha, 8 Beta, 9a alpha-hexahydro-1, 4-methanonaphthalene-5,8-diol.
AD-A197 784

*ZEWAIL, A. H

Time Dependent Absorption of Fragments During Dissociation.

AD-A198 329

*ZEWAIL, AHMED H

Femtosecond Real-Time Observations of Wave Packet Oscillations (Resonance) in Dissociation Reactions.
AD-A197 717

Femtosecond Real-Time Dynamics of Photofragment-Trapping Resonances on Dissociative Potential Energy Surfaces.
AD-A198 020

*ZEWAIL, AHMED H. @

Ultrafast Laser Spectroscopy of Chemical Reactions.
AD-A198 328

*ZHANG, XUEHAI

Anionic Ring-Opening Polymerization of Sila- and Germacyclopent-3-enes.
AD-A197 874

*ZHANG, Z

Photochemistry of Benzocyclobutene.
AD-A198 507

*ZHAO, L. C

Detection of Change Points Using Rank Methods.
AD-A198 405

*ZHOU, JIANXIN

Minimizing the Reflection of Waves by Surface Impedance Using Boundary Elements and Global Optimization.
AD-A200 337

Diagonal Convexity Conditions for Problems in Convex Analysis and Quasi-Variational Inequalities.
AD-A200 547

*ZHOU, QINGSHAN

Anionic Ring-Opening Polymerization of Sila- and Germacyclopent-3-enes.
AD-A197 874

Diels-Alder Reactions of 1,1-dimethyl-2,3,4,5-tetraphenyl-1-silacyclopentadiene, 1,1-dimethyl-2,5-diphenyl-1-silacyclopentadiene and 1,1-dimethyl-3,4-diphenyl-1-silacyclopentadiene with Maleic Anhydride: Kinetic Measurements.
AD-A200 365

*ZHU, D. L

Propagation and Extinction of Stretched Premixed Flames.
AD-A198 450

*ZIMM, MATTHEW B. @

Use of Electron Spin Resonance Spectroscopy to Study the Photochemistry of Adsorbed Dibenzy Ketone on Porous Silica.
AD-A198 220

*ZOEBYSCH, EVE G. @

AM Calculations for Compounds Containing Boron.
AD-A200 196

*ZWI, WELIQ

Experimental Study of Plasmoid Formation and Transport by Means of Moving Magnetic Fields.
AD-A200 005

PERSONAL AUTHOR INDEX-37
UNCLASSIFIED EVJ00F

YU, -ZWA

UNCLASSIFIED

REPORT NUMBER INDEX

68	AD-A198 382	AFOSR-TR-88-0889	AD-A197 899	AFOSR-TR-88-0708	AD-A197 874
87-213-042-01	AD-A197 075	AFOSR-TR-88-0890	AD-A197 917	AFOSR-TR-88-0709	AD-A197 715
88-9552-SUPER-R2	AD-A200 534	AFOSR-TR-88-0891	AD-A198 792	AFOSR-TR-88-0710	AD-A197 869
88SRD012	AD-A199 961	AFOSR-TR-88-0893	AD-A197 810	AFOSR-TR-88-0711	AD-A198 269
153-6773-2	AD-A197 581	AFOSR-TR-88-0894	AD-A198 505	AFOSR-TR-88-0712	AD-A198 508
AFOSR-TR-84-04	AD-A198 295	AFOSR-TR-88-0895	AD-A197 870	AFOSR-TR-88-0715	AD-A198 007
AFOSR-TR-87-0898	AD-A199 955	AFOSR-TR-88-0896	AD-A199 404	AFOSR-TR-88-0716	AD-A197 714
AFOSR-TR-88-0899	AD-A197 759	AFOSR-TR-88-0897	AD-A198 507	AFOSR-TR-88-0717	AD-A197 075
AFOSR-TR-88-129	AD-A197 323	AFOSR-TR-88-0898	AD-A198 270	AFOSR-TR-88-0718	AD-A198 305
AFOSR-TR-88-0290	AD-A198 878	AFOSR-TR-88-0899	AD-A197 765	AFOSR-TR-88-0719	AD-A198 721
AFOSR-TR-88-0365	AD-A197 801	AFOSR-TR-88-0700	AD-A197 953	AFOSR-TR-88-0720	AD-A198 820
AFOSR-TR-88-0494	AD-A197 300	AFOSR-TR-88-0702	AD-A198 143	AFOSR-TR-88-0721	AD-A198 821
AFOSR-TR-88-0578	AD-A198 500	AFOSR-TR-88-0703	AD-A198 501	AFOSR-TR-88-0722	AD-A198 822
AFOSR-TR-88-0804	AD-A197 191	AFOSR-TR-88-0704	AD-A197 453	AFOSR-TR-88-0723	AD-A197 752
AFOSR-TR-88-0810	AD-A197 253	AFOSR-TR-88-0705	AD-A197 686	AFOSR-TR-88-0724	AD-A197 771
AFOSR-TR-88-0843	AD-A197 119	AFOSR-TR-88-0706	AD-A197 700	AFOSR-TR-88-0726	AD-A197 670
AFOSR-TR-88-0862	AD-A197 185	AFOSR-TR-88-0707	AD-A198 068	AFOSR-TR-88-0727	AD-A197 871

REPORT NUMBER INDEX-1
UNCLASSIFIED EVJJOOF

ABSTRACTS

TITLE INDEX

- (1+1) CDAD: A New Technique for Studying Photofragment Alignment.
AD-A198 278
- (1+1) Resonant Enhanced Multiphoton Ionization via the A 2 Sigma + State of NO: Ionic Rotational Branching Ratios and Their Intensity Dependence.
AD-A198 453
- (2+1) REMPI (Resonant-Enhanced Multiphoton Ionization) of NO via D 2 Sigma(+) State: Rotational Branching Ratios.
AD-A198 134
- A 3-D Object Recognition System Using Aspect Graphs.
AD-A198 472
- An Ab Initio Study of the Structure and Bonding of Pralidoxime and Its Conjugate Base.
AD-A200 532
- Abel Inversion Using Transform Techniques.
AD-A199 238
- Absorption of Gaseous Iodine by Polythiophene Films and Powders.
AD-A198 218
- Adaptive Control of Stochastic Bilinear Systems.
AD-A198 387
- Adaptive Control Techniques for Large Space Structures.
AD-A200 208
- Adaptive Hybrid Picture Coding.
AD-A200 059
- Adaptive Policies for Discrete-Time Stochastic Control Systems with Unknown Disturbance Distribution.
AD-A198 069
- Advanced Modeling for Fatigue
- Growth of Small Surface Cracks.
AD-A198 077
- Aerodynamic and Kinetic Processes in Flames.
AD-A198 474
- Affine-Feedback Stabilization of Piecewise-Linear Hypersurface Systems.
AD-A198 317
- Afocal Coupled Etalons. DEM: A High-Resolution Double-Etalon Modulator Spectrometer.
AD-A198 286
- Air Force Research Initiation Program. 1986 Technical Report. Volume 1.
AD-A198 820
- Air Force Research Initiation Program. 1986 Technical Report. Volume 2.
AD-A198 821
- Air Force Research Initiation Program. 1986 Technical Report. Volume 3.
AD-A198 822
- Alfven Waves in a Cold Plasma with Curved Magnetic Fields.
AD-A200 312
- Algorithms for Robust Identification and Control of Large Space Structures. Phase 1.
AD-A198 130
- AM1 Calculations for Compounds Containing Boron.
AD-A200 196
- AM1 Parameters for Zinc.
AD-A197 922
- An AM1 Study of the Cope Rearrangements of Bullvalene, Barabaralane, Semibullvalene, and
- Derivatives of Semibullvalene.
AD-A198 021
- Amine Neurotransmitter Regulation of Long-Term Synaptic Plasticity in Hippocampus.
AD-A200 201
- Analytical and Experimental Characterization of Damage Processes in Composite Laminates.
AD-A198 088
- Anionic Ring-Opening Polymerization of Sila- and Germacyclopent-3-enes.
AD-A187 874
- Anisotropy and Stress Path Effects in Clays with Applications to the Pressuremeter Test.
AD-A189 828
- Anomalies in the Heat-Capacity Signatures of Submonolayer Adsorbates with Attractive Lateral Interactions.
AD-A198 382
- Applications of Operator Theory to Maximum Entropy Problems.
AD-A200 566
- Approximate Evaluation of Reliability and Availability Via Perturbation Analysis.
AD-A199 940
- Aspects of the Chemistry of Water in Ambient-Temperature Chloroaluminate Ionic Liquids: 170 NMR Studies.
AD-A198 225
- Asymptotic Structure and Extinction of Diffusion Flames with Chain Mechanism.
AD-A200 332
- An Asymptotic Theory for Weighted Least Squares with Weights Estimated by Replication.

UNCLASSIFIED

AD-A198 000

Atomic and Molecular Alignment from Photoelectron Angular Distributions in (n+1) Resonantly Enhanced Multiphoton Ionization.
AD-A198 277

Basis Set Effects and the Choice of Reference Geometry in Ab Initio Calculations of Vibrational Spectra.
AD-A198 238

Behavioral Consequences of Neurotransmitter Regulation.
AD-A200 374

Biochemical Mechanisms controlling Bioreactivity of Adrenal Chromaffin Cells.
AD-A198 471

Bioreactivity: Studies on a Simple Brain Stem Reflex in Behaving Animals.
AD-A198 404

Blast Induced Liquefaction of Soils: Laboratory and Field Tests.
AD-A199 995

Bonding at Metal-Ceramic Interfaces in Hybrid Materials.
AD-A197 928

Carbon Monoxide and Turbulence-Chemistry Interactions: Blowoff and Extinction of Turbulent Jet Diffusion Flames.
AD-A199 961

Cellular Mechanisms of Noradrenergic Enhancement of Long-Term Synaptic Potentiation in Hippocampus.
AD-A197 191

Center for Basic Research in Radiation Bioeffects.
AD-A198 154

Ceramics Derived from Organometallic Polymers.
AD-A200 118

Changes in Somatosensory Responsiveness in Behaving Primates.
AD-A198 792

Characterization of Hydroquinone and Related Compounds Adsorbed at Pt(111) from Aqueous Solutions: Electron Energy-Loss Spectroscopy, Auger Spectroscopy, Low Energy Electron Diffraction, and Cyclic Voltammetry.
AD-A197 715

Chemical Processing of Structural Ceramics and Composites.
AD-A200 380

Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 74. Salts of the Anions (W(Triple Bond CR)(CO)2(Eta(5)-C2B9H9Me2))-(R=C6H4Me-2-C6H3Me2-2,6) as Reagents for the Synthesis of Compounds with Heteronuclear Metal-Metal Bonds: Crystal Structure of (N(Et)4)-(FeW(mu-C6H3Me2-2,6)(CO)5(Eta(5)-C2B9H9Me2)).
AD-A200 218

Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 75. Reactions of Octacarbonylacobalt with the Salts (X)(W(triple bond CR)(CO)2(Eta 5-C2B9H9Me2)) (X = NEt4 or PPh4; R = Me, Ph, C6H4Me-2 or C6H4Me-4); Crystal Structure of (PPh4)(Co2W(mu sub 3-CPh)(CO)8(Eta 5-C2B9H9Me2)).0.5CH2Cl2.
AD-A200 065

The Chemistry of Water in Ambient-Temperature Chloroaluminate Ionic Liquids: NMR Studies.
AD-A198 324

Circuit Behavior in the Development of Neuronal Networks.
AD-A198 040

Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (Resonantly Enhanced Multiphoton Ionization) of NO.
AD-A198 367

Collective Properties of Neural Systems and Their Relation to Other Physical Models.
AD-A198 988

Collisional Energy Pooling for Sr(5 3P) + Sr(5 3P') Yields Sr(6 (3,1)S) + Sr(5 1S).
AD-A200 225

Collisional-Induced Absorption in Calcium Rare-Gas Collisions.
AD-A198 831

Competition among Collisional Deactivation, Ionization, and Dissociation in the Multiphoton Excitation of Octafluorocyclooctatetraene.
AD-A200 506

Complex Auditory Signals.
AD-A199 832

Compound Semiconductor Materials. Devices and Circuits.
AD-A197 640

A Computational Method for General Higher Index Nonlinear Singular Systems of Differential Equations.
AD-A199 237

Computational Studies of SiH2+SiH2 Recombination Reaction Dynamics on a Global Potential Surface Fitted to Ab Initio and Experimental Data.
AD-A198 377

Computer Simulations of Radiation

TITLE INDEX-2
UNCLASSIFIED EVJ00F

ATO-COM

Generation from Relativistic
Electron Beams.
AD-A198 627

Conditional Scores and Optimal
Scores for Generalized Linear
Measurement-Error Models.
AD-A198 379

Conference on the
Neurophysiological Foundations of
Visual Perception.
AD-A198 407

A Confidence Interval for Treatment
Component-of-Variance with
Applications to Differences in
Means of Two Exponential
Distributions.
AD-A200 540

Connectionist Models for
Intelligent Computation.
AD-A200 445

Constitutive Behavior of Fiber
Reinforced Sands.
AD-A200 524

Constitutive Modelling of Joints
under Cyclic Loading. Part 1.
Modelling and Testing of Idealized
Rock Joints.
AD-A200 232

Constitutive Modelling of Joints
under Cyclic Loading. Part 2.
Further Development of Hierarchical
Plasticity Model for Joints.
AD-A200 233

Constitutive Modelling of Joints
under Cyclic Loading. Part 3.
Cyclic Multi Degree-of-Freedom
Shear Device with Pore Water
Pressure.
AD-A200 234

Constitutive Modelling of Joints
under Cyclic Loading. Part 4.
Development of Simulated Rock Like

Material and Testing.
AD-A200 235

Context Effects in Recognizing
Syllable-Final /z/ and /s/ in
Different Phrasal Positions.
AD-A198 923

Continuity of Closest Rank-p
Approximations to Matrices.
AD-A200 213

A Convenient Synthesis of Alkali
Metal Selenides and Diselenides in
Tetrahydrofuran and the Reactivity
Differences Exhibited by These
Salts toward Organic Bromides.
Effect of Ultrasound.
AD-A197 869

A Counterexample Concerning the
External Index.
AD-A200 076

Coupled s-Wave and d-Wave States in
the Heavy Fermion Superconductor U
sub 1-x Th sub x Be sub 13.
AD-A197 124

Coupling Linearized Far-Field
Boundary Conditions with Nonlinear
Near-Field Solutions in Transonic
Flow.
AD-A198 721

Covariance Analysis in Generalized
Linear Measurement Error Models.
AD-A197 881

Crazing in Polymeric and Composite
Systems.
AD-A198 372

Crystal Growth and Mechanical
Properties of Semiconductor Alloys.
AD-A198 153

Cumulative Damage Modelling in
Composite Laminates.
AD-A198 282

Cyclic Deformation, Damage, and
Effects of Environment in the Ni3Al
Ordered Alloy at Elevated
Temperatures.
AD-A198 500

Defect Reduction in Epitaxial
Growth Using Superlattice Buffer
Layers.
AD-A198 408

Deformation Behavior of Sands under
Cyclic Loading - A Micro-Structural
Approach.
AD-A199 889

Degenerate Multivariate Stationary
Processes: Basicity, Past and
Future, and Autoregressive
Representation.
AD-A199 929

Desorption of a Two-State System:
Laser Probing of Gallium Atom Spin-
Orbit States from Silicon (100).
AD-A199 239

Detection of Change Points Using
Rank Methods.
AD-A198 406

Detectors of Infrared Radiation
Based on High T(c) Superconducting
YBCO Films.
AD-A199 820

Development and Application of
Oxygen Flow Tagging for Velocity
Measurements and Flow Visualization
in Turbulent Three-Dimensional
Supersonic Flows.
AD-A199 119

Development and Evaluation of a New
Regional Seismic Array in
Finland.
AD-A199 881

Development of Conducting Polymers
of High Structural Strength.
AD-A200 310

TITLE INDEX-3
UNCLASSIFIED EVJ00F

CON-DEV

- Diagonal Convexity Conditions for Problems in Convex Analysis and Quasi-Variational Inequalities. AD-A200 547
- Dialkylamino Phosphorus Metal Carbonyls. 4. Novel Phosphorus-Bridging Carbonyl Derivatives and Triphosphine Derivatives from Reactions of Tetracarbonyldiferrate(II) with (Dialkylamino)dichlorophosphines 1-4. AD-A198 584
- Dialkylamino Phosphorus Metal Carbonyls. 1. Mononuclear Derivatives from Reactions of Bis(diisopropylamino)phosphine with Metal Carbonyls. AD-A198 583
- (Dialkylamino)phosphorus Metal Carbonyls. 5. Chemical Reactivity of the Phosphorus-Bridging Carbonyl Group in Carbonylbis((diisopropylamino)phosphido)hexacarbonyliron(1-4). AD-A198 327
- Dialkylamino Phosphorus Metal Carbonyls. 6. Chemistry of (Tris(diisopropylamino)triphosphine)iron Hexacarbonyl Derivatives Including the Synthesis and Structure of Heterometallic Derivatives 1-4. AD-A198 581
- Dialkylaminophosphorus Metal Carbonyls. 7. Trinuclear Iron Carbonyl Derivatives from Reactions of Disodium Octacarbonyldiferrate with (Dialkylamino)dichlorophosphines. AD-A200 195
- Diels-Alder Reactions of 1,1-dimethyl-2,3,4,5-tetraphenyl-1-silacyclopentadiene, 1,1-dimethyl-2,5-diphenyl-1-silacyclopentadiene and 1,1-dimethyl-3,4-diphenyl-1-silacyclopentadiene with Maleic Anhydride; Kinetic Measurements. AD-A200 385
- DIET in the Second Layer: An ESDIAD (Electron Stimulated Desorption Ion Angular Distribution) Study of NH₃ on a CO Layer on Ni(111) and Ni(110). AD-A197 870
- Diffusion at Interfaces: Microscopic Concepts. Proceedings of a Workshop Held in Campobello Island, Canada on August 18-22 1987. Springer Series in Surface Sciences. Volume 12. AD-A197 758
- Diffusion Equations in Duals of Nuclear Spaces. AD-A200 078
- Diffusion of H Atoms on a Si(111) Surface with Partial Hydrogen Coverage: Monte Carlo Variational Phase-Space Theory with Tunneling Correction. AD-A198 328
- Digital Imaging of Laser-Ignited Combustion. AD-A200 329
- A Dimer Ketone Formed via Fe(CO)₅-Promoted Coupling of 7-Phenoxynorbornadiene to Carbon Monoxide. AD-A197 884
- Discrimination Analysis when the Variables are Grouped and Observed in Sequential Order. AD-A198 405
- Discussion of Box's 1987 Article in Technometrics. AD-A199 823
- Dispersion Strengthening of High Temperature Niobium Alloys.
- Dynamics of Chemisorption/Scattering of Atomic Hydrogen on Partially Covered Si(111) Surfaces. AD-A198 287
- Dynamics of Interaction between a 1,9-Biradical and Lanthanide Ions. AD-A198 086
- Early Phase Interactions of Toluene with Membranes: A Structural and Functional Evaluation. AD-A200 549
- Effects of Autoionizing Resonances on Electron-Impact Excitation Rates for Be-Like Ions. AD-A198 407
- The Effects of Hydrazines on Neuronal Excitability. AD-A200 189
- The Effects of Variance Function Estimation on Prediction and Calibration. An Example. AD-A199 821
- Efficient Nearly Orthogonal Deletion Designs. AD-A197 923
- Electrochemical and Spectroscopic Studies of 1,4-Benzoquinone in Ambient Temperature Chloroaluminate Ionic Liquids. AD-A198 559
- Electrochemistry at Well-Characterized Surfaces. AD-A197 453
- Electrochemistry of Molybdenum Chloride Dimers in a Basic Ambient-Temperature Molten Salt. AD-A198 582
- Electrochemistry of Polythiophene

and Polythiophene Films in
Ambient Temperature Molten Salts.
AD-A198 585

Electromagnetic Cross Sections of
Conductive Fibers: Modified Drude
Equations and Dependence of
Dielectric Constant on Particle
Size.
AD-A198 873

Electromechanical Feedback
Processes in the Ionosphere.
AD-A198 235

Electron Stimulated Desorption from
CO Chemisorbed on Pt(111): A
dynamical Study of Positive Ion and
Metastable CO Emission.
AD-A198 729

The Electronic and Molecular
Structure of Silyl Nitrene.
AD-A198 270

Electronic and Structural Studies
of Carbon/Carbon Composites.
AD-A198 007

Electronic Assignments of the
Violet Bands of Sodium.
AD-A198 839

Electronic Interactions of
Electrons, Photons, and Atoms with
Material Surfaces.
AD-A198 826

Electronic States of the Xe(n)HCl
Systems in Gas and Condensed
Phases.
AD-A198 792

Electrophysiological Actions of
Norepinephrine in Rat Lateral
Hypothalamus. 2. An In Vitro Study
of the Effects of Ionophoretically
Applied Norepinephrine on Lateral
neuronal Responses to Gamma-
Aminobutyric Acid (GABA).
AD-A187 714

Electrophysiological Actions of
Norepinephrine in Rat Lateral
Hypothalamus. 1. Norepinephrine
Induced Modulation of LH Neuronal
Responsiveness to Afferent Synaptic
Inputs and Putative
Neurotransmitters.
AD-A198 189

Energetics and Spin- and Lambda-
Doublet Selectivity in the Infrared
Multiphoton Dissociation HN₃(X 1A)
Yields N₂(X 1 Sigma sub g(+)) +
NH(X 3 Sigma(-), A 1 Delta):
Theory.
AD-A198 928

Equatorial Semiannual Oscillation
in Zonally Averaged Temperature
Observed by the Nimbus 7 SAMS
(stratospheric and Mesospheric
Sounder) and LIMS (Limb Infrared
Monitor of the Stratosphere).
AD-A200 587

Equipment to Upgrade the Facilities
of the IIT (Illinois Institute of
Technology) Fluid Dynamics Research
Center.
AD-A198 084

Estimating Random Integrals from
Noisy Observations: Sampling
Designs and Their Performance.
AD-A197 771

Evaluation Methodology for Software
Engineering.
AD-A198 398

The Evolution of Surfaces in
Turbulence.
AD-A198 388

An Examination of Forcing in Direct
Numerical Simulations of
Turbulence.
AD-A198 278

Experimental Study of Plasmoid
Formation and Transport by Means of

Moving Magnetic Fields.
AD-A200 005

Extinction of Interacting Premixed
Flames: Theory and Experimental
Comparisons.
AD-A198 279

Eye Movements and Visual
Information Processing.
AD-A200 006

Far Field Patterns and the Inverse
Scattering Problem for
Electromagnetic Waves in an
Inhomogeneous Medium.
AD-A200 223

Fault Tolerant Parallel
Implementations of Iterative
Algorithms for Optimal Control
Problems.
AD-A198 041

Femtosecond Real-Time Dynamics of
Photofragment-Trapping Resonances
on Dissociative Potential Energy
Surfaces.
AD-A198 020

Femtosecond Real-Time Observation
of Wave Packet Oscillations
(Resonance) in Dissociation
Reactions.
AD-A197 717

Formation and Electrochemistry of
Polyfluorene in Ambient Temperature
Ionic Liquids.
AD-A198 383

Fragmentation of Molecular
Adsorbates by Electron and Ion
Bombardment: Methoxy Chemistry on
Al(111).
AD-A198 728

Frank Elastic Constants and Leslie-
Eriksen Viscosity Coefficients of
Nematic Solutions of a Rodlike
Polymer.

TITLE INDEX-5
UNCLASSIFIED EVJ00F

ELE-FRA

UNCLASSIFIED

AD-A198 481

Fundamental Processes in Partially Ionized Plasmas.
AD-A198 627

Fundamental Quantum 1/F Noise in Ultrasmall Semiconductor Devices and Their Optimal Design Principles.
AD-A198 482

Fundamental Studies of Carbon, NH, and Oxygen Rings and Other High Energy Density Molecular Systems.
AD-A200 331

Fundamental Understanding of the Intrinsic Ductility in Nickel-Base L1 sub 2 Type Alloys.
AD-A197 605

Fundamentals of Interfacial Strength in Composite Materials.
AD-A198 626

Geotechnical Centrifuge Modeling of Explosion Induced Craters - A Check for Scaling Effects.
AD-A200 280

Harmonizability, V-Boundedness, (2P)-Boundedness of Stochastic Processes.
AD-A200 077

High Pulsed Power, Self Excited Magnetohydrodynamic Power Generation Systems.
AD-A200 258

High Resolution Spectroscopic Studies of Small Molecules.
AD-A199 837

High Temperature Mechanical Testing Facilities.
AD-A200 585

High Temperature Properties of Ceramic/Carbon Systems in an

Oxidizing Environment.
AD-A200 254

Higher Order Mechanisms of Color Vision.
AD-A198 093

Holes, Electrons, Polarons, and Bipolarons and the Thermodynamics of Electrically Active Dopants in Conducting Polymers,
AD-A198 402

Hybrid (Optical/Electronic) Computing and Digital Computing.
AD-A197 722

Identifying Nonlinear Covariate Effects in Semimartingale Regression Models.
AD-A197 323

Immersion and Immersion by Nonsingular Feedback of a Discrete-Time Nonlinear System Into a Linear System.
AD-A198 557

In-Situ Surface during Laser-Controlled Chemical Processing of Surfaces.
AD-A200 206

Individual Differences in Attention.
AD-A199 624

Inequalities for the Trace of Matrix Exponentials.
AD-A198 374

Information Processing of Complex Sounds in the Anteroventral Cochlear Nucleus.
AD-A198 576

Instrumentation Request for Optical Symbolic Computing.
AD-A197 561

Integrated Acoustooptic Device

Modules for Optical Information Processing.
AD-A198 081

Integration of Statistical and Physical Models of Short Fatigue Crack Growth.
AD-A197 917

Intense XUV Radiation Sources.
AD-A200 292

Interaction of Hydrophobic Molecules with Heme Proteins.
AD-A198 747

Interactions Among Drinking and Ground Water Contaminants on Renal and Hepatic Function.
AD-A197 075

Intercalation and Electrical Properties of Highly Ordered Graphite Fibers.
AD-A198 508

Interface Stability between Two Gas Streams of Different Density in a Curved Flow.
AD-A199 874

Intermolecular Interactions and Crystal Stabilities of Tetrathiafulvalene-tetracyanoquinodimethane,
AD-A200 361

The Inverse Scattering Problem for Time-Harmonic Acoustic Waves in an Inhomogeneous Medium,
AD-A200 335

Investigation of a New Concept in Semiconductor Microwave Oscillators.
AD-A198 039

Investigation of Acceleration and Densification of Electrons Utilizing Travelling Magnetic Waves.

UNCLASSIFIED
TITLE INDEX-6
EVJ00F

FUN-INV

- AD-A197 700
Investigation of Defect and Electronic Interactions Associated with GaAs Device Processing.
AD-A200 541
- Investigation of Fuel Additive Effects on Sooting Flames.
AD-A200 273
- Investigation of Liquid Sloshing in Spin-Stabilized Satellites.
AD-A199 628
- Investigation of Phenomena of Discrete Wingtip Jets.
AD-A199 962
- Investigations of the Dynamics and Thermodynamics of the Mesosphere and Upper Thermosphere at the Polar Regions.
AD-A198 463
- Investigations of the Motion of Discrete-Velocity Gases by Cellular Automata.
AD-A200 221
- Investigations of the Optical and Electronic Properties of Crystalline Organic Materials.
AD-A200 074
- Ionic Rotational Branching Ratios in Resonant Enhanced Multiphoton Ionization of NO Via the A $2\Sigma^+$ + (3s sigma) and D $2\Sigma^+$ + (3p sigma) States.
AD-A198 330
- Ionization Rates Relevant to Laser Cooling of Hydrogen.
AD-A198 481
- Joint Service Electronics Program Research in Electronics.
AD-A199 659
- The Kinetics and Dynamics of Iodine
- Monofluoride Formation in Gas-Phase Collisions.
AD-A199 622
- A Langevin-Type Stochastic Differential Equation on a Space of Generalized Functionals.
AD-A199 809
- Laser Fluorescence Excitation Spectrum of Jet-Cooled Tropolone: The A(1) B sub 2 - X(1) A sub 1 System.
AD-A199 730
- Laser Measurements of Transient High-Strength Electric Fields.
AD-A198 247
- Laser Thermal Propulsion.
AD-A200 558
- Lattice Vibrations in Thin-Film Carbon: Electron-Rayleigh-Wave Interaction.
AD-A198 269
- Level Crossings of Filtered Dichotomous Noise.
AD-A198 188
- Line Shape of an Atom-Crystal Bond.
AD-A200 382
- Linear Transformations, Projection Operators and Generalized Inverses: A Geometric Approach.
AD-A197 608
- Long Term Studies of the Refractive Index Structure Parameter in the Troposphere and Stratosphere.
AD-A198 313
- Management and Control of Separation by Unsteady and Vortical Flows.
AD-A198 902
- Management and Control of Unsteady and Turbulent Flows.
- AD-A198 091
A Martingale Characterization of Mixed Poisson Processes.
AD-A198 022
- Massive Symbolic Mathematical Computations and Their Applications.
AD-A200 253
- Material Constraints on Electronic Applications of Oxide Superconductors.
AD-A200 536
- MBE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.
AD-A197 752
- MBE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.
AD-A198 421
- The Measurement and Prediction of Rotordynamic Forces for Labyrinth Seals.
AD-A197 185
- Mechanism of Chain Extension Step in Biosynthesis.
AD-A198 138
- Mechanism of the 1,5-Sigmatropic Hydrogen Shift in 1,3-Pentadiene.
AD-A200 194
- Mechanism of the Thermal Decomposition of Dimethylsilane at Atmospheric Pressures in the Gas Phase.
AD-A200 157
- Mechanisms Mediating the Perception of Complex Acoustic Patterns.

UNCLASSIFIED

AD-A200 530

Mechanistic Studies of Pressure-Assisted Superplasticity of Structural Ceramics.
AD-A200 202

Mega-Amp Opening Switch with Nested Electrodes/Pulsed Generator of Ion and Ion Cluster Beams.
AD-A198 465

Memory-Induced Extra Resonances of Adsorbates.
AD-A198 211

Merged Beam Studies of the Dissociative Recombination of H₃(+) and H₂(+).
AD-A200 526

Microstructure and Properties of Catalysts Symposium Held in Boston, Massachusetts on November 30-December 3, 1987. Materials Research Society Symposium Proceedings. Volume 111.
AD-A197 253

Microstructure, Porosity and Mechanical Property Relationships of Calcium-Silicate-Hydrate.
AD-A200 120

Millimeter Wave Generation Using Josephson Junction Arrays.
AD-A200 259

Minimizing the Reflection of Waves by Surface Impedance Using Boundary Elements and Global Optimization.
AD-A200 337

A Model Reference Adaptive Control Scheme for Pure-Feedback Nonlinear Systems.
AD-A198 386

Modeling of Atomic Processes for X-Ray Laser Plasmas.
AD-A200 219

Modifying Excitation Transfer Cross Sections With an ac Stark Effect.
AD-A197 988

Modulation of Thalamic Somatosensory Neurons by Arousal and Attention.
AD-A200 073

Monolayer and Langmuir-Blodgett Multilayer Surface and Spectral Studies of Poly-3-BCMU.
AD-A198 601

Motion and Stability of Saturated Soil Systems Under Dynamic Loading.
AD-A200 283

The National Diagnostic Facility under Construction.
AD-A198 901

National Research Council Resident Research Associateship (NRC-RRR) program.
AD-A200 183

Nematic Solutions of Rodlike Polymers Light Scattering from Nematic Solutions with Complex Texture and Phase Separation in Poor Solvents.
AD-A198 454

Neurophysiological Research Supporting the Investigation of Adaptive Network Architectures.
AD-A199 878

A New Algorithm for Performance Analysis of Communication Systems.
AD-A197 790

A New Approach to the Analysis and Control of Large Space Structures. Phase 1.
AD-A198 143

New Experimental Challenges in Elemental Fluorine Chemistry: an Emerging Technology.

AD-A198 371

New Insights on Visual Cortex. Abstracts. Center for Visual Science Symposium (18th) Held in Rochester, New York on June 16-18, 1988.
AD-A198 828

A New Mechanism for Superconductivity.
AD-A198 404

A New Process for Final Densification of Ceramics.
AD-A199 959

A New Route to 1,4-Disilabenzenes and 1,4-Disilabarrelenes.
AD-A200 207

Non Contacting Evaluation of Strains and Cracking Using Optical and Infrared Imaging Techniques.
AD-A200 367

Nonlinear Discrete-Time Systems: Algebraic Theory.
AD-A197 921

Nonlinear Dynamic Responses of Composite Rotor Blades.
AD-A200 145

A Nomenclature for Lambda-Doublet Levels in Rotating Linear Molecules.
AD-A199 838

Nonparametric Estimation of Optimal Performance Criteria in Quality Engineering.
AD-A198 315

Norepinephrine Enhances Long-Term Potentiation at Hippocampal Mossy Fiber Synapses.
AD-A197 990

A Note on Computing Robust Regression Estimates via

TITLE INDEX-8
UNCLASSIFIED EVJ00F

MEC-A N

Iteratively Reweighted Least Squares.
AD-A200 181

A Note on Extended Quasi-Likelihood.
AD-A198 042

A Note on Second Order Effects in a Semiparametric Context.
AD-A198 018

Novel ((Diisopropylamino)triphosphine)hexacarbonyldirhenium Complexes.
AD-A197 997

Novel Liquid Crystals - Polymers and Monomers - As Nonlinear Optical Materials.
AD-A200 075

Observation of Molecular Rotors on Surfaces by ESDIAD (Electron Stimulated Desorption Ion Angular Distribution): Studies of PF₃ and NH₃ Chemisorption on Ni Surfaces.
AD-A198 505

On a Correlation Inequality and Its Applications.
AD-A198 295

On a Joint Strong Approximation Theorem for Record and Inter-Record Times.
AD-A198 370

On a Wide Range Exclusion Process in Random Medium with Local Jump Intensity.
AD-A200 510

On Adaptive Control of Stochastic Bilinear Systems.
AD-A198 074

On Continuation for Variational Inequalities.
AD-A200 212

On Exceedance Point Processes for

Stationary Sequences under Mild Oscillation Restrictions.
AD-A198 314

On Functional Estimates for Ill-Posed Linear Problems.
AD-A198 004

On Lifetimes Influenced by a Common Environment.
AD-A198 273

On the Distance between Mixed Poisson and Poisson Distribution.
AD-A198 388

On the Immersion of a Discrete Time Nonlinear System into a Linear System.
AD-A198 316

Opening Switch Research on a Plasma Focus VI.
AD-A198 155

Optical Acquisition, Image and Data Compression.
AD-A199 893

Optical Beam Phase-Conjugation and Electromagnetic Scattering Process with Intense Fields.
AD-A200 372

Optical Fiber Science and Technology: Novel Fibers and Fiber Sensors.
AD-A200 311

Optical Symbolic Processor for Expert System Execution.
AD-A197 868

Optics and Symbolic Computing.
AD-A200 564

The Optimal Projection Equations with Petersen-Holiot Bounds: Robust Stability and Performance via Fixed-Order Dynamic Compensation for Systems with Structured Real-Valued

Parameter Uncertainty.
AD-A198 396

Optimal Rates of Convergence for Deconvolving a Density.
AD-A197 748

Optimum acceleration factors for iterative solutions of linear and non-linear systems.
AD-A198 408

Ordering Methods for Sparse Matrices and Vector Computers.
AD-A198 281

Organic and Polymeric Nonlinear Optical Materials: a Topical Workshop Held in Virginia Beach, Virginia on May 18-19, 1988.
AD-A198 305

Parallel Algorithms for PDE solvers.
AD-A199 825

Parallel Algorithms in the Finite Element Approximation of Flow Problems.
AD-A197 454

PBT, PEO-Based Hybrid Polymers with Nonlinear Optical Properties or High Electrical Conductivity.
AD-A200 225

Perceptual Factors in Workload: A neuromagnetic Study.
AD-A198 487

Pharmacological Resetting of the Circadian Sleep-Wake Cycle.
AD-A200 246

Photochemical Disproportionation Reactions of the W₂(CO)₁₀(2-) and Fe₂(CO)₈(2-) Complexes.
AD-A197 900

Photochemical Generation of Nineteen-Electron Organometallic

TITLE INDEX-9
UNCLASSIFIED EVJ00F

A N-PhG

UNCLASSIFIED

Complexes and Their Use as Reducing Agents in Micellar Systems.
AD-A197 885

Photochemistry of Benzocyclobutene,
AD-A198 507

Photochemistry of Organometallic Halide Complexes. Mechanisms for the Formation of Ionic Products,
AD-A198 488

Photoionization of the Valence Orbitals of OH,
AD-A198 331

The Physics of Spin Polarized Atomic Vapors.
AD-A199 990

Polymeric Heterostructure Thin Films.
AD-A200 363

Polysilylated Unsaturated Molecules.
AD-A198 492

Potentially Aromatic Metallocycles,
AD-A197 765

Powerful Photogenerated Reducing Agents.
AD-A197 949

Preattentive and Attentive Visual Information Processing.
AD-A197 670

Proceedings of the Topical Meeting on the Microphysics of Surfaces, Beams, and Adsorbates (2nd) Held in Santa Fe, New Mexico on 16-18 February 1987.
AD-A197 601

Processability and High Temperature Behavior of Emerging Aerospace Alloys.
AD-A199 926

Propagation and Extinction of Stretched Premixed Flames.
AD-A198 450

Pump/Probe Method for Fast Analysis of Visible Spectral Signatures Utilizing Asynchronous Optical Sampling.
AD-A198 318

Purchase of a Nuclear Magnetic Resonance Spectrometer.
AD-A197 610

Pyridine N-Oxides as Polymeric Nonlinear Optical Materials,
AD-A200 367

A Quick and Easy Multiple Use Calibration Curve Procedure.
AD-A198 227

Radiative Augmented Combustion.
AD-A197 300

The Reactivity of Transition Metal-Silicon Compounds.
AD-A200 371

Reductive Amination of Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-dione,
AD-A198 222

Regulation of Voltage-Dependent Channel Function.
AD-A200 375

Reliability of Complex Devices in Random Environments,
AD-A198 558

Remarks on Discretization and Linear Equivalence of Continuous Time Nonlinear Systems,
AD-A198 388

Remarks on Smooth Feedback Stabilization of Nonlinear Systems,
AD-A198 385

Remarks on the Positivity of Densities of Stable Probability Measure on $R(d)$.
AD-A197 920

Remeasurement of the Rate Constant and Branching Ratio for the $N(2)^+ + O$ Reaction.
AD-A198 388

Removal of Protons from Ambient-Temperature Chloroaluminate Ionic Liquids,
AD-A188 451

Research in Optical Symbolic Computing Tasks.
AD-A199 998

Research Instrumentation for Computer Vision, Image Understanding and Optical Computing.
AD-A198 578

Research on Sputtering of Ferroelectric Thin Films.
AD-A197 899

Research on the Statistics of Grain Lattice Echoes and Their Use in Grain Size Estimation and Grain Echo Suppression.
AD-A199 811

Rheological and Rheo-Optical Studies with Nematogenic Solutions of a Rodlike Polymer: A Review of Data on poly (phenylene Benzobisthiazole).
AD-A197 994

Rheological, Rheo-Optical and Light Scattering Studies on Nematic Solutions of Poly(1,4-Phenylene-2,6-Benzobisthiazole).
AD-A198 380

Rheological Studies on Blends of Rodlike and Flexible Chain Polymers.

AD-A198 455

Robust Algorithms for Detecting a Change in a Stochastic Process with Infinite Memory.

AD-A198 290

Robust, Reduced-Order, Nonstrictly Proper State Estimation via the Optimal Projection Equations with Guaranteed Cost Bounds.

AD-A198 357

The Role of Central Monoaminergic Systems in Arousal and Selective Attention.

AD-A198 298

Role of Retinocortical Processing in Spatial Vision.

AD-A200 198

Role of Surface and Thin Film Composition and Microstructure and Properties of Materials.

AD-A197 995

Scanning Tunneling Microscopy as a Surface Chemical Probe.

AD-A199 922

Semiconductor Alloy Engineering for High-Speed Devices.

AD-A200 358

Shuttle Flight Test of an Advanced Gamma-Ray Detection System.

AD-A198 398

Simultaneous EPR (Electron Paramagnetic Resonance) Electrochemical Measurements on Polyluorene in Ambient Temperature Ionic Liquids.

AD-A198 137

Simultaneous EPR (Electron Paramagnetic Resonance) Electrochemical Measurements on Polypyrrole in Ambient Temperature Ionic Liquids.

AD-A198 323

Single Crystal GaAs Stoichiometry Measurements Through Double Crystal Diffractometry.

AD-B126 593L

Size, Shape and Site Selectivities in the Photochemical Reactions of Molecules Adsorbed on Pentasil Zeolites.

AD-A197 758

Small Strain Response of Random Arrays of Elastic Spheres Using a Nonlinear Distinct Element Procedure.

AD-A198 281

Society for Research on Biological Rhythms (1st) Held on May 11-14, 1988 in Charleston, South Carolina.

AD-A200 134

Some Problems in Nonlinear Analysis.

AD-A198 810

Spatial Light Modulators and Applications. 1988 Technical Digest Series, Volume 8.

AD-A199 279

Spectroscopic and Light Scattering Instrumentation Proposal.

AD-A198 981

Spray Formation: Three-Dimensional Liquid Break-Up due to Surface Tension.

AD-A200 247

State-Selective Studies of T Yields R, V Energy Transfer: The H + CO system.

AD-A198 373

State-Specific Energy Transfer in Diatomic Radicals.

AD-A200 357

Stochastic Evolution Equations Driven by Nuclear-Space-Valued Martingales.

AD-A200 336

Strength and Deformation of Confined and Unconfined Concrete Under Axial Dynamic Loading.

AD-A198 930

Structural Assignment of a Methylocyclopentadiene-Toluquinone Diels-Alder Cycloadduct. Analysis of the Two-Dimensional NMR Spectrum of 1,8-Dimethyl-1-alpha, 4-alpha, 4a-alpha, 5-alpha, 8-Beta, 8a-alpha-hexahydro-1, 4-methanonaphthalene-5,8-diol.

AD-A197 794

Structure and Propagation of Turbulent Premixed Flames Stabilized in a Stagnation Flow.

AD-A198 452

Structure Dynamics of Excited Atoms.

AD-A198 147

Structure of a Bis(eta4-exocyclic-1,3-diene)Fe(CO)3 Complex.

AD-A198 319

Studies of Internal Wave/Mean Flow Interactions.

AD-A199 949

Studies of L-DOPA and Related Compounds Adsorbed from Aqueous Solutions at Pt(100) and Pt(111): Electron Energy-Loss Spectroscopy, Auger Spectroscopy, and Electrochemistry.

AD-A198 501

Studies of Optical Wave Front Conjugation and Imaging Properties of Nematic Liquid Crystal Films.

AD-A197 816

Studies of Unsteadiness in Boundary

TITLE INDEX-11
UNCLASSIFIED EVJ00F

RO8-STU

UNCLASSIFIED

Layers.
AD-A199 989

Study of High Temperature Failure Mechanisms in Ceramics.
AD-A198 375

Studying Quantum Phase-Based Electronic Devices.
AD-A200 378

Sub-Micron Carbon Filaments for Optical Applications.
AD-A198 878

Summary Abstract: The Adsorption and Decomposition of Molybdenum Hexacarbonyl on Mo and Si Surfaces.
AD-A200 358

Sunset over Brownistan.
AD-A198 443

Superconducting Electronic Film Structures.
AD-A200 534

Surface Thermometry of Energetic Materials by Laser-Induced Fluorescence.
AD-A198 084

Symbolic Processor Based Models of Neural Networks.
AD-A200 200

Synaptic Plasticity and Memory Function.
AD-A198 473

Synthesis and Chemistry of Novel Polynitropolycyclic Cage Molecules.
AD-A197 858

Synthesis of New Polynitropolyhedranes.
AD-A198 320

Synthesis of Side Chain Liquid Crystal Polymers for Nonlinear Optics.

AD-A200 388

Synthesis of Trifluorosilyl Organometallic Complexes from Trifluorosilyl Radicals and Metal Atoms.
AD-A198 580

Tail Behaviour for the Supremacy of Gaussian Processes with Applications to Empirical Processes.
AD-A200 511

Test of Equal Gamma-Distribution Means With Unknown and Unequal Shape Parameters.
AD-A200 388

Theoretical Studies of Kinetic Mechanisms of Negative Ion Formation in Plasmas.
AD-A199 994

Theoretical Studies of Silabicyclobutanes and Silacyclobutenes, $CnSi(4-n)H_8$ ($n = 0-4$).
AD-A197 953

Theory of Laser-Pulse-Induced Molecular Dynamics: Gas-Phase Molecular Collisions and Adbond Dynamics.
AD-A197 871

Theory of Nonadiabatic Flame Propagation in Dissociation Equilibrium.
AD-A198 019

Thermal Analysis System (DSC, TGA, TMA) for Oxidation and Phase Transformation Studies of Alloys with Metastable Phase.
AD-A198 420

Thermodynamically Reversible Uptake of Electrically Active Dopants in Conducting Polymers: Iodine in Polythiophene.

AD-A198 378

Third-Order Nonlinear Optical Effects in Organic Polymeric Films.
AD-A198 384

Time Dependent Absorption of Fragments During Dissociation.
AD-A198 329

Topical Meeting on Optics in Adverse Environments: Summaries of Papers Presented at the Optics in Adverse Environments Topical Meeting Held in Albuquerque, New Mexico on 11-12 February 1987. Technical Digest Series. Volume 8.
AD-A197 119

Trajectory Studies of Unimolecular Reactions of Si_2H_4 and SiH_2 on a Global Potential Surface Fitted to Ab Initio and Experimental Data.
AD-A200 389

Transannular Cyclizations in the Pentacyclo(5.4.0.0(2.6).0(3.10).0(5.8))undecane-8,11-Dione System: A reinvestigation.
AD-A198 026

Transient Behaviors in Chemical Reactions: Nanosecond Infrared Spectroscopy, Chemically Pumped Visible and Near-IR Lasers.
AD-A198 484

Transport and Junction Physics of Semiconductor-Metal Eutectic Composites.
AD-A198 480

Tunable Solid State Lasers and Synthetic Nonlinear Materials.
AD-A199 992

Tunneling Microscopy of Superconductors and Tunnel Barriers.
AD-A197 688

TITLE INDEX-12
UNCLASSIFIED EVJ00F

STU-TUN

- Two Photon Detection Techniques for Atomic Fluorine.
AD-A199 955
- Two-photon-Excited Fluorescence Spectroscopy of Atomic Fluorine at 170 nm.
AD-A199 240
- UHV Transport System for Laser Irradiation Studies.
AD-A200 330
- Ultrafast Laser Spectroscopy of Chemical Reactions.
AD-A198 328
- Ultrastructure Processing and Environmental Stability of Advanced Structural and Electronic Materials.
AD-A199 905
- Unified Optimal Projection Equations for Simultaneous Reduced-Order, Robust Modelling, Estimation and Control.
AD-A198 381
- The University of New Hampshire Vacuum Chamber and Charged Particle Calibration Source.
AD-A199 823
- Unsteady Separated Flows: Structures and Processes.
AD-A200 222
- Unsteady Viscous Flows Over Moving Body.
AD-A200 289
- Urban Climate Effects of Energy Demand for Space Heating.
AD-A200 333
- Use of D2 to Elucidate DMAP (organometallic Vapor Phase Epitaxial) Growth Mechanisms.
AD-A199 841
- Use of Electron Spin Resonance Spectroscopy to Study the Photochemistry of Adsorbed Dibenzyl Ketone on Porous Silica.
AD-A198 220
- Validation and Application of Pharmacokinetic Models for Interspecies Extrapolations in Toxicity Risk Assessments of Volatile Organics.
AD-A200 034
- Variance Function Estimation.
AD-A199 822
- Variance Function Estimation in Regression: The Effect of Estimating the Mean.
AD-A198 228
- Variance Functions and the Minimum Detectable Concentration in Assays.
AD-A200 203
- Vector Correlations in the Photodissociation of CH₃I, OCS, and Glyoxal.
AD-A198 332
- Visual Sensitivities and Discriminations and Their Roles in Aviation.
AD-A198 470
- Weighted and Clouded Distributions.
AD-A198 321

UNCLASSIFIED

TITLE INDEX

An Ab Initio Study of the Structure and Bonding of Pralidoxime and Its Conjugate Base,
AD-A200532 REPORT DATE: 88 ANNUAL REPORT

Abel Inversion Using Transform Techniques.
AD-A198236 REPORT DATE: 88 FINAL REPORT

Absorption of Gaseous Iodine by Polythiophene Films and Powders,
AD-A198218 REPORT DATE: 88

Adaptive Control of Stochastic Bilinear Systems,
AD-A198387 REPORT DATE: DEC 87 FINAL REPORT

Adaptive Control Techniques for Large Space Structures.
AD-A200208 REPORT DATE: 23 DEC 87 ANNUAL REPORT

Adaptive Hybrid Picture Coding.
AD-A200059 REPORT DATE: JUL 88 FINAL REPORT

Adaptive Policies for Discrete-Time Stochastic Control Systems with Unknown Disturbance Distribution,
AD-A198089 REPORT DATE: 87 FINAL REPORT

Advanced Modeling for Fatigue Growth of Small Surface Cracks.
AD-A198077 REPORT DATE: 31 MAY 88 FINAL REPORT

Aerodynamic and Kinetic Processes in Flames.
AD-A198474 REPORT DATE: 01 MAY 88 ANNUAL REPORT

Affine-Feedback Stabilization of Piecewise-Linear Hypersurface Systems,
AD-A198317 REPORT DATE: DEC 87 FINAL REPORT

Afocal Coupled Etalons. DEM: A High-Resolution Double-Etalon Modulator Spectrometer,
AD-A198298 REPORT DATE: 15 NOV 88 ANNUAL REPORT

Air Force Research Initiation Program. 1986 Technical Report. Volume 1.
AD-A198820 REPORT DATE: APR 88

Air Force Research Initiation Program. 1986 Technical Report. Volume 2.
AD-A198821 REPORT DATE: APR 88

Air Force Research Initiation Program. 1986 Technical Report. Volume 3.
AD-A198822 REPORT DATE: APR 88

Alfven Waves in a Cold Plasma with Curved Magnetic Fields.
AD-A200312 REPORT DATE: JUN 88 FINAL REPORT

Algorithms for Robust Identification and Control of Large Space Structures. Phase 1.
AD-A198130 REPORT DATE: 14 MAY 88 FINAL REPORT

Amine Neurotransmitter Regulation of Long-Term Synaptic Plasticity in Hippocampus.
AD-A200201 REPORT DATE: 14 JUN 88 FINAL REPORT

TITLE INDEX 1

UNCLASSIFIED EVJ00F

AB - AMI

TITLE INDEX

AM1 Calculations for Compounds Containing Boron,
AD-A200198 REPORT DATE: 88 ANNUAL REPORT

AM1 Parameters for Zinc,
AD-A197922 REPORT DATE: 88 ANNUAL REPORT

An AM1 Study of the Cope Rearrangements of Bullvalene, Barbalane, Semibullvalene, and Derivatives of Semibullvalene,
AD-A198021 REPORT DATE: 88 ANNUAL REPORT

Analytical and Experimental Characterization of Damage Processes in Composite Laminates.
AD-A198068 REPORT DATE: JUN 88 FINAL REPORT

Anionic Ring-Opening Polymerization of Sila- and Germacyclopent-3-enes,
AD-A197874 REPORT DATE: 88 ANNUAL REPORT

Anisotropy and Stress Path Effects in Clays with Applications to the Pressuremeter Test.
AD-A198628 REPORT DATE: 31 JUL 88 FINAL REPORT

Anomalies in the Heat-Capacity Signatures of Submonolayer Adsorbates with Attractive Lateral Interactions,
AD-A198382 REPORT DATE: 01 JAN 88 FINAL REPORT

Applications of Operator Theory to Maximum Entropy Problems.
AD-A200568 REPORT DATE: 08 JUL 88 ANNUAL REPORT

Approximate Evaluation of Reliability and Availability Via Perturbation Analysis.
AD-A199940 REPORT DATE: MAR 88 FINAL REPORT

Aspects of the Chemistry of Water in Ambient-Temperature Chlorosulfonate Ionic Liquids: 170 NMR Studies.
AD-A198225 REPORT DATE: 87

Asymptotic Structure and Extinction of Diffusion Flames with Chain Mechanism.
AD-A200332 REPORT DATE: 88 FINAL REPORT

An Asymptotic Theory for Weighted Least Squares with Weights Estimated by Replication.
AD-A198000 REPORT DATE: AUG 88

Atomic and Molecular Alignment from Photoelectron Angular Distributions in (n+1) Resonantly Enhanced Multiphoton Ionization.
AD-A198277 REPORT DATE: 15 JAN 88 ANNUAL REPORT

Basis Set Effects and the Choice of Reference Geometry in Ab Initio Calculations of Vibrational Spectra.
AD-A199238 REPORT DATE: 88 FINAL REPORT

Behavioral Consequences of Neurotransmitter Regulation.
AD-A200374 REPORT DATE: 01 SEP 88 FINAL REPORT

Biochemical Mechanisms Controlling Bioreactivity of Adrenal Chromaffin Cells.
AD-A198471 REPORT DATE: 17 JUN 88 FINAL REPORT

Bioreactivity: Studies on a Simple Brain Stem Reflex in Behaving Animals.
AD-A199404 REPORT DATE: 22 JUL 88 ANNUAL REPORT

UNCLASSIFIED

TITLE INDEX

Blast Induced Liquefaction of Solids: Laboratory and Field Tests.
AD-A199995 REPORT DATE: 25 JUN 88 FINAL REPORT

Bonding at Metal-Ceramic Interfaces in Hybrid Materials.
AD-A197928 REPORT DATE: 30 JUN 88 ANNUAL REPORT

Carbon Monoxide and Turbulence-Chemistry Interactions: Blowoff and Extinction of Turbulent Jet Diffusion Flames.
AD-A199961 REPORT DATE: 31 AUG 88 FINAL REPORT

Cellular Mechanisms of Noradrenergic Enhancement of Long-Term Synaptic Potentiation in Hippocampus.
AD-A197191 REPORT DATE: 88 FINAL REPORT

Center for Basic Research in Radiation Bioeffects.
AD-A198154 REPORT DATE: 15 JUN 88 FINAL REPORT

Ceramics Derived from Organo-Metallic Polymers.
AD-A200118 REPORT DATE: JUL 88 FINAL REPORT

Changes in Somatosensory Responsiveness in Behaving Primates.
AD-A198782 REPORT DATE: 01 AUG 88 FINAL REPORT

Characterization of Hydroquinone and Related Compounds Adsorbed at Pt(111) from Aqueous Solutions: Electron Energy-Loss Spectroscopy, Auger Spectroscopy, Low Energy Electron Diffraction, and Cyclic Voltammetry.
AD-A197715 REPORT DATE: 88 ANNUAL REPORT

Chemical Processing of Structural Ceramics and Composites.
AD-A200360 REPORT DATE: SEP 88 FINAL REPORT

Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 74. Salts of the Anions (W(Triple Bond CR)(CO)2 (Eta(5)-C2B9H9Me2))-(R=C6H4Me-2 or C6H3Me2-2,6) as Reagents for the Synthesis of Compounds with Heteronuclear Metal-Metal Bonds: Crystal Structure of (N(Et)4)-(FeW(mu-CC6H3Me2-2,6)(CO)5(Eta(5)-C2B9H9Me2)).
AD-A200218 REPORT DATE: 88

Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 75. Reactions of Octacarbonyldicobalt with the Salts (X)(W(triple bond CR)(CO)2(eta 5-C2B9H9Me2)) (X = NEt4 or PPh4; R = Me, Ph, C6H4Me-2, or C6H4Me-4); Crystal Structure of (PPh4)(Co2W(mu sub 3-CpH)(CO)8(eta 5-C2B9H9Me2)).O.5CH2Cl2.
AD-A200065 REPORT DATE: 88 FINAL REPORT

The Chemistry of Water in Ambient-Temperature Chloroaluminate Ionic Liquids: NMR Studies.
AD-A198324 REPORT DATE: 87

Circuit Behavior in the Development of Neuronal Networks.
AD-A198040 REPORT DATE: 28 FEB 88 FINAL REPORT

Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (Resonantly Enhanced Multiphoton Ionization) of NO.
AD-A198367 REPORT DATE: 15 DEC 87 FINAL REPORT

Collective Properties of Neural Systems and Their Relation to Other Physical Models.
AD-A199988 REPORT DATE: 05 AUG 88 FINAL REPORT

TITLE INDEX 3

BLA - COL

UNCLASSIFIED EVJ00F

UNCLASSIFIED

TITLE INDEX

Collisional Energy Pooling for $\text{Sr}(5\ 3\text{P}) + \text{Sr}(5\ 3\text{P})$ Yields $\text{Sr}(6\ (3.1\text{S}) + \text{Sr}(5\ 1\text{S})$.
AD-A200225 REPORT DATE: 01 AUG 88 FINAL REPORT

Collisional-Induced Absorption in Calcium Rare-Gas Collisions,
AD-A198831 REPORT DATE: AUG 88 FINAL REPORT

Competition among Collisional Deactivation, Ionization, and Dissociation in the Multiphoton Excitation of Octafluorocyclooctatetraene,
AD-A200508 REPORT DATE: 88

Complex Auditory Signals.
AD-A198832 REPORT DATE: SEP 88 FINAL REPORT

Compound Semiconductor Materials, Devices and Circuits.
AD-A197840 REPORT DATE: JUN 88 ANNUAL REPORT

A Computational Method for General Higher Index Nonlinear Singular Systems of Differential Equations.
AD-A199237 REPORT DATE: 06 AUG 88 FINAL REPORT

Computational Studies of $\text{SiH}_2\text{-SiH}_2$ Recombination Reaction Dynamics on a Global Potential Surface Fitted to Ab Initio and Experimental Data.
AD-A198377 REPORT DATE: 01 MAY 88 FINAL REPORT

Computer Simulations of Radiation Generation from Relativistic Electron Beams.
AD-A198827 REPORT DATE: 30 SEP 87 FINAL REPORT

Conditional Scores and Optimal Scores for Generalized Linear Measurement-Error Models.
AD-A198378 REPORT DATE: 87 FINAL REPORT

Conference on the Neurophysiological Foundations of Visual Perception.
AD-A198407 REPORT DATE: 15 MAR 88 FINAL REPORT

A Confidence Interval for Treatment Component-of-Variance with Applications to Differences in Means of Two Exponential Distributions.
AD-A200540 REPORT DATE: 88 ANNUAL REPORT

Connectionist Models for Intelligent Computation.
AD-A200445 REPORT DATE: 30 AUG 88 ANNUAL REPORT

Constitutive Behavior of Fiber Reinforced Sands.
AD-A200524 REPORT DATE: 20 AUG 88 FINAL REPORT

Constitutive Modelling of Joints under Cyclic Loading. Part 1. Modelling and Testing of Idealized Rock Joints.
AD-A200232 REPORT DATE: 31 JUL 88 FINAL REPORT

Constitutive Modelling of Joints under Cyclic Loading. Part 2. Further Development of Hierarchical Plasticity Model for Joints.
AD-A200233 REPORT DATE: JUL 88 FINAL REPORT

TITLE INDEX

4

COL - CON

UNCLASSIFIED

EVJ00F

UNCLASSIFIED

TITLE INDEX

Constitutive Modelling of Joints under Cyclic Loading. Part 3. Cyclic Multi Degree-of-Freedom Shear Device with Pore Water Pressure.

AD-A200234 REPORT DATE: JUL 88 FINAL REPORT

Constitutive Modelling of Joints under Cyclic Loading. Part 4. Development of Simulated Rock Like Material and Testing.

AD-A200235 REPORT DATE: JUL 88 FINAL REPORT

Context Effects in Recognizing Syllable-Final /z/ and /s/ in Different Phrasal Positions.

AD-A199923 REPORT DATE: 06 SEP 88 ANNUAL REPORT

Continuity of Closest Rank-p Approximations to Matrices.

AD-A200213 REPORT DATE: AUG 87

A Convenient Synthesis of Alkali Metal Selenides and Diselenides in Tetrahydrofuran and the Reactivity Differences Exhibited by These Salts toward Organic Bromides. Effect of Ultrasound.

AD-A197869 REPORT DATE: 88 ANNUAL REPORT

A Counterexample Concerning the External Index.

AD-A200076 REPORT DATE: AUG 88 FINAL REPORT

Coupled s-Wave and d-Wave States in the Heavy Fermion Superconductor U sub 1-x Th sub x Be sub 13.

AD-A197124 REPORT DATE: JUN 88 FINAL REPORT

Coupling Linearized Far-Field Boundary Conditions with Nonlinear Near-Field Solutions in Transonic Flow.

AD-A198721 REPORT DATE: 29 FEB 88 FINAL REPORT

Covariance Analysis in Generalized Linear Measurement Error Models.

AD-A197861 REPORT DATE: AUG 88

Crazing in Polymeric and Composite Systems.

AD-A198372 REPORT DATE: 30 APR 88 ANNUAL REPORT

Crystal Growth and Mechanical Properties of Semiconductor Alloys.

AD-A198153 REPORT DATE: 14 APR 88 FINAL REPORT

Cumulative Damage Modelling in Composite Laminates.

AD-A198282 REPORT DATE: 29 FEB 88 FINAL REPORT

Cyclic Deformation, Damage, and Effects of Environment in the Ni3Al Ordered Alloy at Elevated Temperatures.

AD-A198500 REPORT DATE: 01 MAY 88 ANNUAL REPORT

Defect Reduction in Epitaxial Growth Using Superlattice Buffer Layers.

AD-A198409 REPORT DATE: JUL 88 FINAL REPORT

Deformation Behavior of Sands under Cyclic Loading - A Micro-Structural Approach.

AD-A199999 REPORT DATE: 01 SEP 88 FINAL REPORT

Degenerate Multivariate Stationary Processes: Basicity, Past and Future, and Autoregressive Representation.

AD-A199928 REPORT DATE: 87 FINAL REPORT

UNCLASSIFIED

TITLE INDEX

Desorption of a Two-State System: Laser Probing of Gallium Atom Spin-Orbit States from Silicon (100).
AD-A198238 REPORT DATE: JUL 88 FINAL REPORT

Detection of Charge Points Using Rank Methods.
AD-A198408 REPORT DATE: MAR 88 FINAL REPORT

Detectors of Infrared Radiation Based on High T(c) Superconducting YBCO Films.
AD-A198820 REPORT DATE: 23 FEB 88 ANNUAL REPORT

Development and Application of Oxygen Flow Tagging for Velocity Measurements and Flow Visualization in Turbulent Three-Dimensional Supersonic Flows.
AD-A200119 REPORT DATE: 14 SEP 88 ANNUAL REPORT

Development and Evaluation of a New Regional Seismic Array in Fennoscandia.
AD-A198881 REPORT DATE: MAY 88 FINAL REPORT

Development of Conducting Polymers of High Structural Strength.
AD-A200310 REPORT DATE: 31 MAY 88 FINAL REPORT

Diagonal Convexity Conditions for Problems in Convex Analysis and Quasi-Variational Inequalities.
AD-A200547 REPORT DATE: 88 FINAL REPORT

Dialkylamino Phosphorus Metal Carbonyls. 4. Novel Phosphorus-Bridging Carbonyl Derivatives and Triphosphine Derivatives from Reactions of Tetracarbonylferrate(-II) with (Dialkylamino)dichlorophosphines 1-4.
AD-A198564 REPORT DATE: 87 FINAL REPORT

Dialkylamino Phosphorus Metal Carbonyls. 1. Mononuclear Derivatives from Reactions of Bis(diisopropylamino)phosphine with Metal Carbonyls.
AD-A198583 REPORT DATE: 86 FINAL REPORT

Dialkylamino Phosphorus Metal Carbonyls. 8. Chemistry of (Tris(diisopropylamino)triphosphine)diron Hexacarbonyl Derivatives Including the Synthesis and Structure of Heterometallic Derivatives 1-4.
AD-A198581 REPORT DATE: 86 FINAL REPORT

Dialkylaminophosphorus Metal Carbonyls. 7. Trinuclear Iron Carbonyl Derivatives from Reactions of Disodium Octacarbonyldiferrate with (Dialkylamino)dichlorophosphines.
AD-A200195 REPORT DATE: 88 ANNUAL REPORT

Dialkylamino)phosphorus Metal Carbonyls. 5. Chemical Reactivity of the Phosphorus-Bridging Carbonyl Group in Carbonylbis((diisopropylamino)phosphido)hexacarbonyldiron(1-4).
AD-A198327 REPORT DATE: 88

Diels-Alder Reactions of 1,1-dimethyl-2,3,4,5-tetraphenyl-1-silacyclopentadiene, 1,1-dimethyl-2,5-diphenyl-1-silacyclopentadiene and 1,1-dimethyl-3,4-diphenyl-1-silacyclopentadiene with Maleic Anhydride; Kinetic Measurements.
AD-A200365 REPORT DATE: 88 FINAL REPORT

DIET in the Second Layer: An ESDIAD (Electron Stimulated Desorption Ion Angular Distribution) Study of NH3 on a CO Layer on Ni(111) and Ni(110).
AD-A197870 REPORT DATE: 88 ANNUAL REPORT

TITLE INDEX 6

DES - DIE

UNCLASSIFIED EVJ00F

UNCLASSIFIED

TITLE INDEX

- Diffusion at Interfaces: Microscopic Concepts. Proceedings of a Workshop Held in Campobello Island, Canada on August 18-22 1987. Springer Series in Surface Sciences. Volume 12.
AD-A197759 REPORT DATE: 88 FINAL REPORT
- Diffusion Equations in Duals of Nuclear Spaces.
AD-A200078 REPORT DATE: JUL 88 FINAL REPORT
- Diffusion of H Atoms on a Si(111) Surface with Partial Hydrogen Coverage: Monte Carlo Variational Phase-Space Theory with Tunneling Correction.
AD-A198328 REPORT DATE: 01 JUN 88
- Digital Imaging of Laser-Ignited Combustion.
AD-A200329 REPORT DATE: JUN 88 FINAL REPORT
- A Dimer Ketone Formed via Fe(CO)5-Promoted Coupling of 7-Phenoxynorbornadiene to Carbon Monoxide.
AD-A197884 REPORT DATE: 88 ANNUAL REPORT
- Discrimination Analysis when the Variates are Grouped and Observed in Sequential Order.
AD-A198405 REPORT DATE: FEB 88 FINAL REPORT
- Discussion of Box's 1987 Article in Technometrics.
AD-A199823 REPORT DATE: FEB 88 FINAL REPORT
- Dispersion Strengthening of High Temperature Niobium Alloys.
AD-A199958 REPORT DATE: 31 MAY 88 ANNUAL REPORT
- Dynamics of Chemisorption/Scattering of Atomic Hydrogen on Partially Covered Si(111) Surfaces.
AD-A198297 REPORT DATE: 88 ANNUAL REPORT
- Dynamics of Interaction between a 1,9-Biradical and Lanthanide Ions.
AD-A198088 REPORT DATE: 88 FINAL REPORT
- Early Phase Interactions of Toluene with Membranes: A Structural and Functional Evaluation.
AD-A200549 REPORT DATE: 31 AUG 88 FINAL REPORT
- Effects of Autoionizing Resonances on Electron-Impact Excitation Rates for Be-Like Ions.
AD-A198407 REPORT DATE: 15 APR 88 FINAL REPORT
- The Effects of Hydrazines on Neuronal Excitability.
AD-A200199 REPORT DATE: 10 JUN 88 ANNUAL REPORT
- The Effects of Variance Function Estimation on Prediction and Calibration. An Example.
AD-A199821 REPORT DATE: 88 FINAL REPORT
- Efficient Nearly Orthogonal Deletion Designs.
AD-A197923 REPORT DATE: APR 88 ANNUAL REPORT
- Electrochemical and Spectroscopic Studies of 1,4-Benzoquinone in Ambient Temperature Chloroaluminate Ionic Liquids.
AD-A198559 REPORT DATE: FEB 88 FINAL REPORT

TITLE INDEX

Electrochemistry at Well-Characterized Surfaces,
AD-A197453 REPORT DATE: 88 FINAL REPORT

Electrochemistry of Molybdenum Chloride Dimers in a Basic Ambient-Temperature Molten Salt,
AD-A198562 REPORT DATE: 88 FINAL REPORT

Electrochemistry of Polythiophene and Polybithiophene Films in Ambient Temperature Molten Salts.
AD-A198568 REPORT DATE: NOV 87 FINAL REPORT

Electromagnetic Cross Sections of Conductive Fibers: Modified Drude Equations and Dependence of Dielectric Constant on Particle Size.
AD-A198873 REPORT DATE: 31 AUG 88 FINAL REPORT

Electromechanical Feedback Processes in the Ionosphere.
AD-A199235 REPORT DATE: 31 AUG 88 FINAL REPORT

Electron Stimulated Desorption from CO Chemisorbed on Pt(111): A Dynamical Study of Positive Ion and Metastable CO Emission.
AD-A199729 REPORT DATE: 88 ANNUAL REPORT

The Electronic and Molecular Structure of Silyl Nitrene,
AD-A198270 REPORT DATE: 29 APR 88 ANNUAL REPORT

Electronic and Structural Studies of Carbon/Carbon Composites.
AD-A198007 REPORT DATE: 88

Electronic Assignments of the Violet Bands of Sodium,
AD-A198839 REPORT DATE: 05 SEP 88 ANNUAL REPORT

Electronic Interactions of Electrons, Photons, and Atoms with Material Surfaces.
AD-A198628 REPORT DATE: 31 AUG 88 FINAL REPORT

Electronic States of the Xe(n)HCl Systems in Gas and Condensed Phases.
AD-A199792 REPORT DATE: 01 SEP 88 ANNUAL REPORT

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AD-A197714 REPORT DATE: 88

Electrophysiological Actions of Norepinephrine in Rat Lateral Hypothalamus. 1. Norepinephrine Induced Modulation of LH Neuronal Responsiveness to Afferent Synaptic Inputs and Putative Neurotransmitters.
AD-A198189 REPORT DATE: 88

Energetics and Spin- and Lambda-Doublet Selectivity in the Infrared Multiphoton Dissociation $\text{H}_2\text{O}^+(\text{X } 1\text{A})$ Yields $\text{N}_2(\text{X } 1\text{Sigma sub g}(+)) + \text{NH}(\text{X } 3\text{Sigma}(-))$, A 1 Delta): Theory.
AD-A199928 REPORT DATE: 01 AUG 88 FINAL REPORT

Equatorial Semiannual Oscillation in Zonally Averaged Temperature Observed by the Nimbus 7 SAMS (Stratospheric and Mesospheric Sounder) and LIMS (Limb Infrared Monitor of the Stratosphere).
AD-A200567 REPORT DATE: 20 APR 88 FINAL REPORT

UNCLASSIFIED

TITLE INDEX

Equipment to Upgrade the Facilities of the IIT (Illinois Institute of Technology) Fluid Dynamics Research Center.
AD-A198084 REPORT DATE: JUN 88 FINAL REPORT

Estimating Random Integrals from Noisy Observations: Sampling Designs and Their Performance.
AD-A197771 REPORT DATE: JAN 88 ANNUAL REPORT

Evaluation Methodology for Software Engineering.
AD-A198398 REPORT DATE: 31 MAY 88 FINAL REPORT

The Evolution of Surfaces in Turbulence, 88 FINAL REPORT
AD-A198368 REPORT DATE: 88 FINAL REPORT

An Examination of Forcing in Direct Numerical Simulations of Turbulence.
AD-A198276 REPORT DATE: 88 ANNUAL REPORT

Experimental Study of Plasmod Formation and Transport by Means of Moving Magnetic Fields.
AD-A200005 REPORT DATE: 12 FEB 88 FINAL REPORT

Extinction of Interacting Premixed Flames: Theory and Experimental Comparisons.
AD-A198279 REPORT DATE: 86 ANNUAL REPORT

Eye Movements and Visual Information Processing.
AD-A200008 REPORT DATE: 02 AUG 88 FINAL REPORT

Far Field Patterns and the Inverse Scattering Problem for Electromagnetic Waves in an Inhomogeneous Medium.
AD-A200223 REPORT DATE: 88 FINAL REPORT

Fault Tolerant Parallel Implementations of Iterative Algorithms for Optimal Control Problems.
AD-A198041 REPORT DATE: 21 JAN 88 ANNUAL REPORT

Femtosecond Real-Time Dynamics of Photofragment-Trapping Resonances on Dissociative Potential Energy Surfaces.
AD-A198020 REPORT DATE: 06 MAY 88 ANNUAL REPORT

Femtosecond Real-Time Observation of Wave Packet Oscillations (Resonance) in Dissociation Reactions.
AD-A197717 REPORT DATE: 15 MAY 88 ANNUAL REPORT

Formation and Electrochemistry of Polyfluorene in Ambient Temperature Ionic Liquids.
AD-A198383 REPORT DATE: JAN 88 FINAL REPORT

Fragmentation of Molecular Adsorbates by Electron and Ion Bombardment: Methoxy Chemistry on Al(111).
AD-A199728 REPORT DATE: 15 AUG 88 ANNUAL REPORT

Frank Elastic Constants and Leslie-Ericksen Viscosity Coefficients of Nematic Solutions of a Rodlike Polymer.
AD-A198461 REPORT DATE: 87 ANNUAL REPORT

Fundamental Processes in Partially Ionized Plasmas.
AD-A198627 REPORT DATE: 15 MAY 88 FINAL REPORT

Fundamental Quantum 1/F Noise in Ultrasmall Semiconductor Devices and Their Optimal Design Principles.
AD-A198462 REPORT DATE: 31 MAY 88 ANNUAL REPORT

TITLE INDEX

Fundamental Studies of Carbon, Nitrogen, and Oxygen Rings and Other High Energy Density Molecular Systems.
AD-A200331 REPORT DATE: 30 AUG 88 FINAL REPORT

Fundamental Understanding of the Intrinsic Ductility in Nickel-Base L1 sub 2 Type Alloys.
AD-A197805 REPORT DATE: 30 JUN 88 FINAL REPORT

Fundamentals of Interfacial Strength in Composite Materials.
AD-A198626 REPORT DATE: 16 NOV 87 ANNUAL REPORT

Geotechnical Centrifuge Modeling of Explosion Induced Craters - A Check for Scaling Effects.
AD-A200290 REPORT DATE: 07 JUL 88 FINAL REPORT

Harmonizability, V-Boundedness, (2P)-Boundedness of Stochastic Processes.
AD-A200077 REPORT DATE: AUG 88 FINAL REPORT

High Pulsed Power, Self Excited Magneto-hydrodynamic Power Generation Systems.
AD-A200258 REPORT DATE: 27 DEC 85 FINAL REPORT

High Resolution Spectroscopic Studies of Small Molecules.
AD-A198837 REPORT DATE: DEC 87 ANNUAL REPORT

High Temperature Mechanical Testing Facilities.
AD-A200585 REPORT DATE: 08 SEP 88 FINAL REPORT

High Temperature Properties of Ceramic/Carbon Systems in an Oxidizing Environment.
AD-A200254 REPORT DATE: 31 MAY 86 ANNUAL REPORT

Higher Order Mechanisms of Color Vision.
AD-A198093 REPORT DATE: 26 JUN 88 ANNUAL REPORT

Holes, Electrons, Polarons, and Bipolarons and the Thermodynamics of Electrically Active Dopants in Conducting Polymers.
AD-A198402 REPORT DATE: 88 FINAL REPORT

Hybrid (Optical/Electronic) Computing and Digital Computing.
AD-A197722 REPORT DATE: 01 JUN 88 ANNUAL REPORT

Identifying Nonlinear Covariate Effects in Semiparametric Regression Models.
AD-A197323 REPORT DATE: JUN 88 FINAL REPORT

Immersion and Immersion by Nonlinear Feedback of a Discrete-Time Nonlinear System Into a Linear System.
AD-A198557 REPORT DATE: MAY 88 FINAL REPORT

Individual Differences in Attention.
AD-A198624 REPORT DATE: 18 JUL 88 FINAL REPORT

Inequalities for the Trace of Matrix Exponentials.
AD-A198374 REPORT DATE: APR 88 FINAL REPORT

Information Processing of Complex Sounds in the Anteroventral Cochlear Nucleus.
AD-A198576 REPORT DATE: APR 88 FINAL REPORT

UNCLASSIFIED

TITLE INDEX

Instrumentation Request for Optical Symbolic Computing.

AD-A197561 REPORT DATE: 07 JUL 88 FINAL REPORT

Integrated Acoustooptic Device Modules for Optical Information Processing.

AD-A198061 REPORT DATE: 18 JUL 88

Integration of Statistical and Physical Models of Short Fatigue Crack Growth.

AD-A197917 REPORT DATE: JUN 88 FINAL REPORT

Intense XUV Radiation Sources.

AD-A200292 REPORT DATE: 30 SEP 87 FINAL REPORT

Interaction of Hydrophobic Molecules with Heme Proteins.

AD-A198747 REPORT DATE: 29 AUG 88 FINAL REPORT

Interactions Among Drinking and Ground Water Contaminants on Renal and Hepatic Function.

AD-A197075 REPORT DATE: 25 JUL 88 ANNUAL REPORT

Intercalation and Electrical Properties of Highly Ordered Graphite Fibers.

AD-A198508 REPORT DATE: 88 FINAL REPORT

Interface Stability between Two Gas Streams of Different Density in a Curved Flow.

AD-A199874 REPORT DATE: AUG 88 FINAL REPORT

Intermolecular Interactions and Crystal Stabilities of Tetrathiafulvalene-tetracyanoquinodimethane.

AD-A200361 REPORT DATE: 88 FINAL REPORT

The Inverse Scattering Problem for Time-Harmonic Acoustic Waves in an Inhomogeneous Medium.

AD-A200335 REPORT DATE: 88 FINAL REPORT

Investigation of a New Concept in Semiconductor Microwave Oscillators.

AD-A198039 REPORT DATE: 31 MAY 88 ANNUAL REPORT

Investigation of Acceleration and Densification of Electrons Utilizing Travelling Magnetic Waves.

AD-A197700 REPORT DATE: 19 APR 88 FINAL REPORT

Investigation of Defect and Electronic Interactions Associated with GaAs Device Processing.

AD-A200541 REPORT DATE: 01 AUG 88 ANNUAL REPORT

Investigation of Fuel Additive Effects on Sooting Flames.

AD-A200273 REPORT DATE: 30 JUN 88 ANNUAL REPORT

Investigation of Liquid Sloshing in Spin-Stabilized Satellites.

AD-A199629 REPORT DATE: 31 JAN 88 ANNUAL REPORT

Investigation of Phenomena of Discrete Wingtip Jets.

AD-A199962 REPORT DATE: AUG 88 FINAL REPORT

Investigations of the Dynamics and Thermodynamics of the Mesosphere and Upper Thermosphere at the Polar Regions.

AD-A198463 REPORT DATE: 01 JUN 88 FINAL REPORT

TITLE INDEX 11

UNCLASSIFIED EVJ00F

INS - INV

TITLE INDEX

Investigations of the Motion of Discrete-Velocity Gases by Cellular Automata.
AD-A200221 REPORT DATE: 02 SEP 88 FINAL REPORT

Investigations of the Optical and Electronic Properties of Crystalline Organic Materials.
AD-A200074 REPORT DATE: 22 AUG 88 ANNUAL REPORT

In-Situ Surface during Laser-Controlled Chemical Processing of Surfaces.
AD-A200206 REPORT DATE: 20 JUN 88 FINAL REPORT

Ionic Rotational Branching Ratios in Resonant Enhanced Multiphoton Ionization of NO Via the A $2\Sigma^+$ + (3s sigma) and D $2\Sigma^+$ + (3p sigma) States.
AD-A198330 REPORT DATE: 15 JAN 88 FINAL REPORT

Ionization Rates Relevant to Laser Cooling of Hydrogen.
AD-A198481 REPORT DATE: JUN 88 FINAL REPORT

Joint Service Electronics Program: Research in Electronics.
AD-A199859 REPORT DATE: 01 JUN 88 FINAL REPORT

The Kinetics and Dynamics of Iodine Monofluoride Formation in Gas-Phase Collisions.
AD-A198622 REPORT DATE: 15 SEP 88 FINAL REPORT

A Langevin-Type Stochastic Differential Equation on a Space of Generalized Functionals.
AD-A199809 REPORT DATE: AUG 88 ANNUAL REPORT

Laser Fluorescence Excitation Spectrum of Jet-Cooled Tropolone: The A(1) B sub 2 - X(1) A sub 1 System.
AD-A198730 REPORT DATE: 15 JAN 88 ANNUAL REPORT

Laser Measurements of Transient High-Strength Electric Fields.
AD-A198247 REPORT DATE: 15 JUL 87 FINAL REPORT

Laser Thermal Propulsion.
AD-A200558 REPORT DATE: SEP 88 ANNUAL REPORT

Lattice Vibrations in Thin-Film Carbon: Electron-Rayleigh-Wave Interaction.
AD-A198289 REPORT DATE: 15 APR 88 ANNUAL REPORT

Level Crossings of Filtered Dichromatic Noise.
AD-A198188 REPORT DATE: 01 MAR 88

Line Shape of an Atom-Crystal Bond.
AD-A200362 REPORT DATE: 15 JUL 88 FINAL REPORT

Linear Transformations, Projection Operators and Generalized Inverses; A Geometric Approach.
AD-A197608 REPORT DATE: MAR 88 FINAL REPORT

Long Term Studies of the Refractive Index Structure Parameter in the Troposphere and Stratosphere.
AD-A198313 REPORT DATE: 88 FINAL REPORT

UNCLASSIFIED

TITLE INDEX

Management and Control of Separation by Unsteady and Vortical Flows.

AD-A198902 REPORT DATE: JUN 88 FINAL REPORT

Management and Control of Unsteady and Turbulent Flows.

AD-A198091 REPORT DATE: JUN 88 ANNUAL REPORT

A Martingale Characterization of Mixed Poisson Processes.

AD-A198022 REPORT DATE: 87 ANNUAL REPORT

Massive Symbolic Mathematical Computations and Their Applications.

AD-A200253 REPORT DATE: 16 AUG 88 ANNUAL REPORT

Material Constraints on Electronic Applications of Oxide Superconductors.

AD-A200538 REPORT DATE: 88 ANNUAL REPORT

MSE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.

AD-A198421 REPORT DATE: 30 JUN 87 ANNUAL REPORT

MSE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.

AD-A197752 REPORT DATE: 31 DEC 87 ANNUAL REPORT

The Measurement and Prediction of Rotordynamic Forces for Labyrinth Seals.

AD-A197185 REPORT DATE: MAR 88 FINAL REPORT

Mechanism of Chain Extension Step in Biosynthesis.

AD-A198138 REPORT DATE: 88 FINAL REPORT

Mechanism of the Thermal Decomposition of Dimethylsilane at Atmospheric Pressures in the Gas Phase.

AD-A200187 REPORT DATE: 88 ANNUAL REPORT

Mechanism of the 1,5-Sigmatropic Hydrogen Shift in 1,3-Pentadiene.

AD-A200194 REPORT DATE: 88 ANNUAL REPORT

Mechanisms Mediating the Perception of Complex Acoustic Patterns.

AD-A200530 REPORT DATE: 28 SEP 88 FINAL REPORT

Mechanistic Studies of Pressure-Assisted Superplasticity of Structural Ceramics.

AD-A200202 REPORT DATE: 15 JUL 88

Mega-Amp Opening Switch with Nested Electrodes/Pulsed Generator of Ion and Ion Cluster Beams.

AD-A198485 REPORT DATE: 30 JUL 87 ANNUAL REPORT

Memory-Induced Extra Resonances of Adsorbates.

AD-A198211 REPORT DATE: 11 APR 88

Merged Beam Studies of the Dissociative Recombination of H₃(+) and H₂(+).

AD-A200528 REPORT DATE: 30 SEP 87 FINAL REPORT

TITLE INDEX

Microstructure and Properties of Catalysts Symposium Held in Boston, Massachusetts on November 30-December 3, 1987.
Materials Research Society Symposium Proceedings, Volume 111.
AD-A197253 REPORT DATE: 87 FINAL REPORT

Microstructure, Porosity and Mechanical Property Relationships of Calcium-Silicate-Hydrate.
AD-A200120 REPORT DATE: 15 AUG 88 ANNUAL REPORT

Millimeter Wave Generation Using Josephson Junction Arrays.
AD-A200259 REPORT DATE: 31 JUL 88 FINAL REPORT

Minimizing the Reflection of Waves by Surface Impedance Using Boundary Elements and Global Optimization.
AD-A200337 REPORT DATE: JUN 88 FINAL REPORT

A Model Reference Adaptive Control Scheme for Pure-Feedback Nonlinear Systems.
AD-A198388 REPORT DATE: JUN 87 FINAL REPORT

Modeling of Atomic Processes for X-Ray Laser Plasmas.
AD-A200219 REPORT DATE: JUL 88 FINAL REPORT

Modifying Excitation Transfer Cross Sections with an ac Stark Effect.
AD-A197986 REPORT DATE: MAY 88

Modulation of Thalamic Somatosensory Neurons by Arousal and Attention.
AD-A200073 REPORT DATE: 23 AUG 88 FINAL REPORT

Monolayer and Langmuir-Blodgett Multilayer Surface and Spectral Studies of Poly-3-BCM.
AD-A198601 REPORT DATE: 88 ANNUAL REPORT

Motion and Stability of Saturated Soil Systems Under Dynamic Loading.
AD-A200293 REPORT DATE: 28 FEB 88 FINAL REPORT

The National Diagnostic Facility under Construction.
AD-A198901 REPORT DATE: JUN 88 FINAL REPORT

National Research Council Resident Research Associateship (NRC-RRS) Program.
AD-A200183 REPORT DATE: AUG 88 ANNUAL REPORT

Nematic Solutions of Rodlike Polymers Light Scattering from Nematic Solutions with Complex Texture and Phase Separation in Poor Solvents.
AD-A198454 REPORT DATE: 87 ANNUAL REPORT

Neurophysiological Research Supporting the Investigation of Adaptive Network Architectures.
AD-A199878 REPORT DATE: MAY 88 FINAL REPORT

A New Algorithm for Performance Analysis of Communication Systems.
AD-A197790 REPORT DATE: APR 88 ANNUAL REPORT

A New Approach to the Analysis and Control of Large Space Structures, Phase 1.
AD-A198143 REPORT DATE: 12 MAR 88 FINAL REPORT

UNCLASSIFIED

TITLE INDEX

- New Experimental Challenges in Elemental Fluorine Chemistry: an Emerging Technology.
AD-A198371 REPORT DATE: 31 OCT 87 FINAL REPORT
- New Insights on Visual Cortex. Abstracts. Center for Visual Science Symposium (16th) Held in Rochester, New York on June 16-18, 1988.
AD-A199826 REPORT DATE: JUN 88 FINAL REPORT
- A New Mechanism for Superconductivity.
AD-A198404 REPORT DATE: DEC 87 FINAL REPORT
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TITLE INDEX

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UNCLASSIFIED

TITLE INDEX

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TITLE INDEX 17

UNCLASSIFIED EVJ00F

OPT - PHO

TITLE INDEX

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UNCLASSIFIED

TITLE INDEX

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TITLE INDEX 19

REG - ROB

UNCLASSIFIED EVJ00F

UNCLASSIFIED

TITLE INDEX

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ROL - SPR

TITLE INDEX 20

UNCLASSIFIED EVJ00F

UNCLASSIFIED

TITLE INDEX

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TITLE INDEX 21

STA - SUM

UNCLASSIFIED EVJ00F

TITLE INDEX

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UNCLASSIFIED

TITLE INDEX

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UNCLASSIFIED

TITLE INDEX

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Unsteady Viscous Flows Over Moving Body.
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1+1)CDAD: A New Technique for Studying Photofragment Alignment.
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AD-A198134 REPORT DATE: 03 JUL 87 FINAL REPORT

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TITLE INDEX 24

UNCLASSIFIED EVJ00F

UNS - 3-D

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-B126 593L 14/2 20/2

AD-A200 567 4/1

ARIZONA STATE UNIV TEMPE SEMICONDUCTOR MATERIALS
RESEARCH LAB

NORTHWEST RESEARCH ASSOCIATES INC BELLEVUE WA

(U) Single Crystal GaAs Stoichiometry Measurements Through
Double Crystal Diffractometry.(U) Equatorial Semiannual Oscillation in Zonally Averaged
Temperature Observed by the Nimbus 7 SAMS
(Stratospheric and Mesospheric Sounder) and LIMS (Limb
Infrared Monitor of the Stratosphere).

DESCRIPTIVE NOTE: Final rept. 1 Oct 88-30 Apr 88.

APR 88

AUG 88

PERSONAL AUTHORS: Krasnicki, S.; Subramony, V.

PERSONAL AUTHORS: Delisi, Donald P.; Dunkerton, Timothy J.

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CONTRACT NO. F49620-86-C-0026, NASW-4145

PROJECT NO. 2917

PROJECT NO. 2310

TASK NO. A3

TASK NO. A1

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TR-88-1071

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referred to AFOSR/XOTD, Bldg. 410, Bolling AFB, DC 20332.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research,
V93 nD4 p3899-3904, 20 Apr 88.

ABSTRACT: (U) This report is the description of a Double
Crystal Diffractometer. The machine is an X ray
diffractometer for X ray rocking curves obtained from
semiconductor wafers (Si, GaAs and others). A detailed
description of the mechanical and electronic units of the
diffractometer is given. Software documentation is
provided. Instrument performance tests are presented.
Semiconductor crystals, Silicon, Gallium arsenides, X
rays, Double crystal topography, Rocking curves,
Characterization. (MUM)

DESCRIPTORS: (U) *CRYSTALS, *DIFFRACTOMETERS, *GALLIUM
ARSENIDES, COMPUTER PROGRAM DOCUMENTATION, ELECTRONICS,
INSTRUMENTATION, MECHANICAL PROPERTIES, PERFORMANCE TESTS,
SEMICONDUCTORS, SILICON, TOPOGRAPHY, WAFERS, X RAYS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2917A3.

AD-B126 593L

AD-A200 567

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 567 CONTINUED

AD-A200 586 17/4

planetary Rossby wave momentum transport. Second, evidence of strong polar-tropical coupling in the northern winter indicates that mean meridional circulations are present on a global scale. Nonlinear advection by these circulations is quantitatively significant in the semiannual oscillation. Reprints. (JHD)

MARYLAND UNIV COLLEGE PARK

(U) Applications of Operator Theory to Maximum Entropy Problems.

DESCRIPTIVE NOTE: Annual rept. 15 Jun 87-14 Jun 88.

DESCRIPTORS: (U) *REMOTE DETECTORS, *MONITORING, *ATMOSPHERIC TEMPERATURE, *METEOROLOGICAL SATELLITES, *ATMOSPHERIC TEMPERATURE, ADVECTION, ASYMMETRY, CURVATURE, EQUATORIAL REGIONS, EXTREMITIES, GLOBAL, GRAVITY WAVES, HEAT BALANCE, INFRARED RADIATION, MEAN, MESOSPHERE, NONLINEAR SYSTEMS, NORTH(DIRECTION), OSCILLATION, REPRINTS, SCALE, SEASONAL VARIATIONS, SHEAR PROPERTIES, SOUNDING, SOUNDING ROCKETS, STRATOSPHERE, TRANSMISSIVITY, VERTICAL ORIENTATION, ORIENTATION(DIRECTION), WIND, WINTER.

JUL 88

PERSONAL AUTHORS: Lay, David C.; Ellis, Robert L.; Gohberg, Israel

CONTRACT NO. AFOSR-87-0287

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-88-1111

IDENTIFIERS: (U) PE81102F, WUAFOSR2310A1,
SAMS(Stratospheric and Mesospheric Sounder), LIMS(Limb
Infrared Monitor of the Stratosphere), Nimbus 7 satellite.

UNCLASSIFIED REPORT

ABSTRACT: (U) This project is focusing on problems in operator theory and matrix theory that underlie the maximum entropy principles in signal processing and system theory. We have found generalizations of this principle for finite-dimensional problems to certain broad classes of hermitian band matrices, including Toeplitz matrices, and we have shown why a similar principle cannot exist for all hermitian band matrices. Zeros of orthogonal polynomials are studied in a setting that generalizes the usual minimum phase theorem for the error prediction filters related to stationary time series. In another paper, we analyze the number of negative eigenvalues of an extension of a hermitian band matrix in terms of the entries in the band matrix. From this we obtain results on maximum entropy and on singular values of extensions of triangular matrices. The latter results are related to the finite-dimensional model reduction problem for linear systems. Keywords: Operator theory, Matrix theory, Maximum entropy principles, Band matrices, Toeplitz matrix, Orthogonal polynomials, Negative eigenvalues, Signal processing, Model reduction, Linear systems. (MJM)

DESCRIPTORS: (U) *PREDICTIONS, *SYSTEMS ANALYSIS, *COUNTERMEASURES, EIGENVALUES, ENTROPY, FILTERS, FOCUSING, LINEAR SYSTEMS, MATRIX THEORY, MODELS.

AD-A200 587

AD-A200 586

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 586 CONTINUED

AD-A200 585 11/8.1

OPERATORS(MATHEMATICS), ORTHOGONALITY, POLYNOMIALS,
REDUCTION, SIGNAL PROCESSING, SIZES(DIMENSIONS),
STATIONARY, THEOREMS, THEORY, TIME SERIES ANALYSIS, VALUE.

CALIFORNIA UNIV DAVIS DEPT OF MECHANICAL ENGINEERING
(U) High Temperature Mechanical Testing Facilities.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A8, TOEPLITZ
MATRIX.

DESCRIPTIVE NOTE: Final rept. 1 Jun 87-31 May 88.

SEP 88

PERSONAL AUTHORS: Mukherjee, Aniya K.; Gibeling, Jeffrey
C.

CONTRACT NO. AFOSR-87-0239

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-88-1108

UNCLASSIFIED REPORT

ABSTRACT: (U) The mechanical testing facilities at the University of California, Davis have been upgraded through the purchase of a servohydraulic testing machine, a high temperature high vacuum creep machine, an ion beam milling system for TEM specimen preparation and a computer-based acquisition system. This equipment is being used to study the basic relationships between microstructure and mechanical properties in high temperature structural materials. This document describes the acquired equipment. Keywords: Mechanical testing; Structural materials; Ion milling; Servohydraulic system; Computer-based data acquisition; Creep testing; Alloys; Test equipment. (KT)

DESCRIPTORS: (U) *ALLOYS, *CREEP TESTS, *MICROSTRUCTURE, *TEST AND EVALUATION, CALIFORNIA, CHEMICAL MILLING, COMPUTER APPLICATIONS, CONSTRUCTION MATERIALS, DATA ACQUISITION, DETECTORS, HIGH TEMPERATURE, ION BEAMS, MECHANICAL PROPERTIES, TEST EQUIPMENT, TEST FACILITIES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2917A3.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 584 12/9 9/5

AD-A200 558 21/2 9/3

BDW CORP MCLEAN VA

TENNESSEE UNIV SPACE INST TULLAHOOMA

(U) Optics and Symbolic Computing.

(U) Laser Thermal Propulsion.

DESCRIPTIVE NOTE: Annual technical rept.,

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 87-31 Aug 88,

APR 88

SEP 88

PERSONAL AUTHORS: Athale,

PERSONAL AUTHORS: Keefer, Dennis

REPORT NO. BDM/MCL-88-0074-YR

CONTRACT NO. AFOSR-88-0317

CONTRACT NO. F49620-88-C-0030

PROJECT NO. 2308

MONITOR: AFOSR

TR-88-1028

UNCLASSIFIED REPORT

ABSTRACT: (U) Many problems in Artificial Intelligence are intractable due to the exponential growth of the solution space with problem size. Often these problems can benefit from heuristic search or forward-checking techniques which attempt to prune the search space down to a manageable size before or during the actual search procedure. Many interesting search problems can be formulated as consistent labeling problem in which initial problem information is given in the form of a set of binary constraint, for which Boolean matrices are a natural data representation. In this paper optical implementations of Boolean matrix operations are proposed for manipulating the constraint matrices to perform forward-checking and thereby increase the search efficiency. The high degree of parallelism afforded by using optical techniques and the relatively low accuracy requirements of Boolean matrix operations suggest that optical techniques are well matched to this problem. (JMD)

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *SEARCHING, *SYMBOLIC PROGRAMMING, ACCURACY, DATA PROCESSING, EFFICIENCY, EXPONENTIAL FUNCTIONS, GROWTH(GENERAL), HEURISTIC METHODS, METHODOLOGY, OPTICS, REQUIREMENTS, BOOLEAN ALGEBRA, MATRICES(MATHEMATICS).

IDENTIFIERS: (U) PER1102F.

AD-A200 584

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research investigation is to determine, experimentally and analytically, the physical mechanisms that determine the behavior of continuous and quasi-continuous, laser sustained plasmas (LSP). The principal questions involve the effects of a forced convection environment, optical geometry and pulse format on the stability, fractional power absorption, plasma structure, and fluid mixing. The future application of this technology to space propulsion rests on the availability of lasers with powers in the megawatt range. It now appears likely that lasers of this size will be free electron lasers (FEL) that produce power as a series of pulses, rather than continuously. Transient argon plasmas were created using the 20 ns pulse from an excimer laser at a wavelength of 307 nm. These plasmas were self initiated from optical breakdown, requiring no auxiliary means for initiation as in the case for cw sustained plasmas. The decay of these plasmas were monitored using an optical multichannel analyzer (OMA), and it was found that the plasmas decayed with microsecond time scales. Keywords: Laser propulsion, Laser sustained plasmas, Plasma spectroscopy, Argon plasmas, Optical plasmas, Free electron lasers. (MUM)

DESCRIPTORS: (U) *COMBUSTION, *IGNITION, *LASERS, ANALYZERS, ARGON, CONVECTION, ENVIRONMENTS, EXCIMER.

AD-A200 558

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 558 CONTINUED

FLUIDS, FORMATS, FREE ELECTRON LASERS, GEOMETRY, MICROSECOND TIME, MIXING, MULTICHANNEL, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, PHYSICAL PROPERTIES, PLASMAS(PHYSICS), PROPULSION SYSTEMS, PULSES, SCALE, SPACE PROPULSION, SPECTROSCOPY, THERMAL PROPULSION SYSTEMS, TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WJAFOSR2308A1, LASER PLASMAS, LASER PROPULSION.

AD-A200 549 8/11

PURDUE UNIV LAFAYETTE IN DEPT OF MEDICINAL CHEMISTRY AND PHARMACOGNOSY

(U) Early Phase Interactions of Toluene with Membranes: A Structural and Functional Evaluation.

DESCRIPTIVE NOTE: Final rept. 1 Jan 88-30 Jun 88,

AUG 88

PERSONAL AUTHORS: Morre, D. J.

CONTRACT NO. F49620-85-K-0003

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-88-1188

UNCLASSIFIED REPORT

ABSTRACT: (U) The most sensitive cell component to toluene was the plasma membrane where a morphological response in terms of a loss of membrane protuberances and a response in terms of enzymatic activity was observed at 25 ppm both with treatment times of 5 min or less. Thus the plasma membrane is indicated as one important target for toluene intoxication. A perturbation of an ATP or ATPase-dependent reaction is indicated. A second target identified was that of the transition region between endoplasmic reticulum and Golgi apparatus where transfer of material appears to be blocked rapidly by 100 ppm or lower toluene both in situ and in a cell-free system newly developed to study this phenomenon. Specifically, membranes involved in the internal trafficking between the endoplasmic reticulum and the Golgi apparatus fail to form protuberances. Again perturbation of the ATP or ATP-dependent step is indicated together with a related involvement of boundary lipids of membrane proteins involved in membrane energization that provide some common denominator between the two different sites of toluene action at the subcellular level. Keywords: Toxicity. (aw)

DESCRIPTORS: (U) *ENZYMES, *MEMBRANES(BIOLOGY), *TOLUENES, *TOXICITY, BOUNDARIES, CELLS, CELLS(BIOLOGY),

AD-A200 558

AD-A200 549

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 549 CONTINUED

AD-A200 547 12/2

INTERACTIONS, INTOXICATION, LIPIDS, LOSSES,
MORPHOLOGY(BIOLOGY), PROTEINS, PROTUBERANCES,
RESPONSE(BIOLOGY), SENSITIVITY, SITES, TARGETS, TEST AND
EVALUATION, ADENOSINE PHOSPHATES, PHOSPHATASES.

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF
MATHEMATICS

(U) Diagonal Convexity Conditions for Problems in Convex
Analysis and Quasi-Variational Inequalities.

IDENTIFIERS: (U) PE81102F, Plasma membranes.

DESCRIPTIVE NOTE: Rept. for 1 Sep 85-31 Aug 87.

88

PERSONAL AUTHORS: Zhou, Jianxin; Chen, Goong

CONTRACT NO. AFOSR-85-0253

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-1107

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Mathematical Analysis
and Applications, v132 p213-225 1988.

ABSTRACT: (U) Many problems in constrained optimization
can be formulated as convex analysis or quasi-variational
inequalities problems. The existence of solutions for
such problems can be derived by using a class of weaker
convexity (or concavity) conditions which require a
functional $\psi(x,y)$ to be quasi-convex or convex for
diagonal entries of certain type. In this paper, we
discuss such conditions and use them to generalize
several important theorems such as Ky Fan's inequality
and saddle point theorem and some recent results in quasi-
variational inequalities. Reprints. (jnd)

DESCRIPTORS: (U) *INEQUALITIES, VARIATIONAL METHODS,
CONVEX BODIES, OPTIMIZATION, REPRINTS, NUMERICAL METHODS
AND PROCEDURES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1, Saddle point
method.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 541 7/2

AD-A200 541 CONTINUED

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS
SCIENCE AND ENGINEERING

ELECTRON ACCEPTORS, ELECTRONICS, ENERGY LEVELS, GETTERING,
IMPURITIES, INSULATION, INTERACTIONS, SHALLOW DEPTH,
THESES, TRANSITION METALS.

(U) Investigation of Defect and Electronic Interactions
Associated with GaAs Device Processing.

IDENTIFIERS: (U) PE81102F, WJAFOSR2308B1.

DESCRIPTIVE NOTE: Annual rept. 28 Feb 87-29 Feb 88.

AUG 88

PERSONAL AUTHORS: Legowski, Jacek; Gatos, Harry C.

CONTRACT NO. AFOSR-88-0342

PROJECT NO. 2308

TASK NO. B1

MONITOR: AFOSR
TR-88-1125

UNCLASSIFIED REPORT

ABSTRACT: (U) Our research in the period Feb. 28, 1987 to Feb 29, 1988 resulted in five publications enclosed with this report and two completed Ph.D. theses. The research focussed on the properties of low diffusivity transition elements and their direct role (compensating levels) and indirect role (impurity gettering) in achieving semi-insulating II-V compounds. The results of our systematic study on optical and electronic properties of vanadium in GaAs were summarized in a detailed publication. A similar publication, dealing with properties of titanium, is under preparation. Our study established the positions of the energy levels of substitutional Vanadium and Titanium (both donor and acceptor states) and concluded that they are not suitable for achieving semi-insulating GaAs. In Inp, however, the deep Ti donor level (Ti4+/Ti3+) has an ideal location (0.83 eV below the conduction band) for producing a new type of semi-insulating Inp based on codoping with Ti and shallow acceptors. In spite of wrong energy level positions, the vanadium was found to be beneficial for obtaining semi-insulating GaAs. Gallium arsenides. (MCM)

DESCRIPTORS: (U) *GALLIUM ARSENIDES, *GROUP III COMPOUNDS, *GROUP V COMPOUNDS, *PROCESSING, *TITANIUM, *VANADIUM, COMPENSATION, CONDUCTION BANDS, DIFFUSIVITY.

AD-A200 541

AD-A200 541

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 540 12/3

AD-A200 540 CONTINUED

MISSOURI UNIV-ROLLA DEPT OF MATHEMATICS AND STATISTICS

(U) A Confidence Interval for Treatment Component-of-Variance With Applications to Differences in Means of Two Exponential Distributions.

IDENTIFIERS: (U) PE61102F.

88

PERSONAL AUTHORS: Samararatnayake, V.A.; Bain, Lee J.

CONTRACT NO. AFOSR-84-0164

PROJECT NO. 2304

MONITOR: AFOSR
TR-88-1056

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Statistical Computation and Simulation, v28 p317-332 1988.

ABSTRACT: (U) There is no exact small sample solution for setting confidence intervals for the treatment component in one factor components-of-variance problem, or for the problem of setting confidence intervals for the difference in means of two exponential distributions. A large number of approximate methods have been proposed for the components-of-variance problem. In a published study of nine of these methods, two have shown promise. The properties of these two as well as a third method, proposed by the authors, are investigated and shown to perform surprisingly well in the components-of-variance setting. The problem concerning difference of two exponential means is mathematically similar to the components-of-variance problem except that the parameter about which a confidence interval is to be built may take negative values. One may also wish to require a symmetry in the method so that the solution does not depend on the order in which the two samples are labelled. Adaptations of the above mentioned methods to the exponential means problem are given. It is shown, by a Monte-Carlo study, that two of the methods perform quite well for the exponential problem. (KR)

DESCRIPTORS: (U) *CONFIDENCE LIMITS, *EXPONENTIAL FUNCTIONS, *INTERVALS, APPROXIMATION(MATHEMATICS), MONTE CARLO METHOD, SAMPLING, STATISTICAL DISTRIBUTIONS, VALUE.

AD-A200 540

AD-A200 540

UNCLASSIFIED

PAGE

3

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 538 20/12 9/1

AD-A200 534 20/12 9/1 20/3 20/2

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH
PAWESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH
PA(U) Material Constraints on Electronic Applications of
Oxide Superconductors.

(U) Superconducting Electronic Film Structures.

88

DESCRIPTIVE NOTE: Semiannual rept. 1 Jan-30 Jun 88.

JUL 88

PERSONAL AUTHORS: Braginski, A.I.

PERSONAL AUTHORS: Braginski, A. I.; Gavalier, J. R.;
Talvacchio, J.

CONTRACT NO. F49820-88-C-0039

PROJECT NO. 2308

REPORT NO. 88-9S52-SUPER-R2

TASK NO. C1

CONTRACT NO. F49820-88-C-0039

MONITOR: AFOSR

PROJECT NO. 2308

TR-88-1105

TASK NO. C1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics C, v153-155 p1598-
1603 1988.

UNCLASSIFIED REPORT

ABSTRACT: (U) It is shown that oxide superconductor film
surface and interface degradation represents the main
obstacle to electronic applications. Surface quality
requirements imposed by passive components appear less
stringent than those necessary for functional tunnel
junctions. Reprints. (RH)ABSTRACT: (U) Modification in Y-Ba-Cu-O growth
procedures were instituted to eliminate non-
superconducting near-surface layers observed in films.
These include much higher ramp rates to the 850 C
crystallization temperature of the as-deposited amorphous
films and the use of an entirely in-situ processing.
Films have now been grown which are superconducting up to
the surface. Other Y-Ba-Cu-O films have been sputtered
which are crystalline (tetragonal) as-deposited. These
films. Gold layers deposited at room temperature on
recent films were found to have contact resistance less
than the limit of the apparatus sensitivity. Evidence for
crystallinity and epitaxy was found in 10 nm YBCO films
deposited at 850 C from the vapor phase. Measurements on
superconducting resonator cavities have begun using
epitaxial films on SrTiO3 substrates. Thin epitaxial MgO
layers were grown on sapphire to eventually provide a
better substrate for this application. Y-Ba-Cu-O/MgO/NiO
tunnel junctions were fabricated. Non-continuous barrier
layer produced superconducting shorts in the junctions.
This result, however, provided the non-ambiguous evidence
that the new growth procedures had produced films which
were superconducting up to the surface. (RH)DESCRIPTORS: (U) *ELECTRONICS, *FILMS, *INTERFACES,
*JUNCTIONS, *OXIDES, *SUPERCONDUCTORS,
*TUNNELING(ELECTRONICS), DEGRADATION, PASSIVE SYSTEMS,
QUALITY ASSURANCE, REPRINTS, REQUIREMENTS, SURFACES.

IDENTIFIERS: (U) PE61102F, WJAF05R2308C1.

AD-A200 538

AD-A200 534

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 534 CONTINUED

AD-A200 532 7/3 8/15

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

DESCRIPTORS: (U) *CAVITY RESONATORS, *ELECTRONIC EQUIPMENT, *EPITAXIAL GROWTH, *JUNCTIONS, *SEMICONDUCTING FILMS, *SUPERCONDUCTORS, *TUNNELING(ELECTRONICS), FILMS, GOLD, GROWTH(GENERAL), HIGH RATE, LAYERS, PROCESSING, RAMPS, ROOM TEMPERATURE, SAPPHIRE, SENSITIVITY, STRUCTURAL PROPERTIES, STRUCTURES, SUBSTRATES, VAPOR PHASES.

(U) An Ab Initio Study of the Structure and Bonding of Pralidoxime and Its Conjugate Base, 88

PERSONAL AUTHORS: Ewig, Carl S.; Van Wazer, John R.

IDENTIFIERS: (U) PE81102F, WUAFOSR2306C1.

CONTRACT NO. AFOSR-82-0100, SAFOSR-85-0072

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-1031

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Structure (TheoChem) v188 p235-246 1988.

ABSTRACT: (U) The pralidoxime (2-PAM) cation and its conjugate base have been studied by ab initio methods. Properties computed include their detailed molecular structures, as well as the number and structures of all conformers formed by rotation about double bonds, the number of conformers formed by rotation about single bonds, the relative energy differences between species and conformers, and the charge distributions of both species. The results show that the conjugate base exhibits a much different structure than that of pralidoxime itself. The former is found to possess two stable conformers while the latter has three. All these differences may be related to charge redistribution accompanying steric and stereoelectronic effects on the molecular structures. Keywords: Antidotes; Reprints. (aw)

DESCRIPTORS: (U) *ANTIDOTES, *OXIMES, BONDED JOINTS, ENERGY, MOLECULAR STRUCTURE, REPRINTS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B3, PRALIDOXIMES.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 530 6/4 5/8

AD-A200 528 7/2 7/4

WISCONSIN UNIV-MILWAUKEE DEPT OF PSYCHOLOGY

UNIVERSITY OF WESTERN ONTARIO LONDON DEPT OF PHYSICS

(U) Mechanisms Mediating the Perception of Complex Acoustic Patterns.

(U) Merged Beam Studies of the Dissociative Recombination of H₃(+) and H₂(+).

DESCRIPTIVE NOTE: Final rept. 1 Aug 85-30 Jul 88,

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-31 Aug 87,

SEP 88

SEP 87

PERSONAL AUTHORS: Warren, Richard M.

PERSONAL AUTHORS: Mitchell, J. B.

CONTRACT NO. AFOSR-85-0280

CONTRACT NO. AFOSR-88-0234

PROJECT NO. 2313

PROJECT NO. 2301

TASK NO. A8

TASK NO. A7

MONITOR: AFOSR
TR-88-1180

MONITOR: AFOSR
TR-88-0998

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The completed research program has dealt with the mechanisms and principle governing the perception of complex sounds. The main topics studied were: 1) Pitch averaging mechanisms for repetition pitch; 2) spectral and temporal mechanisms underlying some novel perceptual effects observed with complex tones mistuned from unison; 3) a comparison of tonal and infratonal auditory induction and their underlying mechanisms; 4) monaural ear advantages for infratonal periodicity detection and its implications for subcortical periodicity processing; and 5) evidence that perception of infratonal periodicity does not depend solely upon the recognition of the repetition of singularities, but also involves a holistic pattern recognition. Keywords: Auditory perception. (AW)

DESCRIPTORS: (U) *AUDITORY PERCEPTION, ACOUSTICS, AUDIO TONES, DETECTION, HEARING, MEAN, PATTERNS, PERCEPTION, PATTERN RECOGNITION, SOUND PITCH, REPETITION RATE, SOUND.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A8.

ABSTRACT: (U) This report is intended to provide an update on the progress of an ongoing investigation into the recombination of electrons with hydrogenic molecular ions, namely, hydrogen +2, and hydrogen +3. Recombination is of major importance in determining the physical and chemical state of plasmas such as are found in hydrogen ion sources. Molecular ions are usually created with considerable internal energy in the form of vibrational and rotational excitation. Under this condition such ions generally exhibit large recombination rates and will represent a significant loss mechanism for low energy electrons in the discharge. These electrons are needed for attachment to vibrationally excited hydrogen 2 molecules in order to produce H₂ (mjm)

DESCRIPTORS: (U) *HYDROGEN, *ION SOURCES, *MOLECULAR IONS, *RECOMBINATION REACTIONS, CHEMICALS, ELECTRONS, ENERGY, EXCITATION, INTERNAL, IONS, LOSSES, LOW ENERGY, PHYSICAL PROPERTIES, RATES, ROTATION, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7.

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 524 8/10

AD-A200 524 CONTINUED

MICHIGAN UNIV ANN ARBOR DEPT OF CIVIL ENGINEERING

(U) Constitutive Behavior of Fiber Reinforced Sands.

DESCRIPTIVE NOTE: Final rept. 1 May 87-31 Aug 88,

AUG 88

PERSONAL AUTHORS: Gray, Donald H.

CONTRACT NO. AFOSR-87-0184

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-88-1007

UNCLASSIFIED REPORT

ABSTRACT: (U) Conclusions include: 1) The failure surface in a triaxial compression test of randomly distributed, fiber reinforced sand is planar and oriented in the same manner as predicted by the Coulomb theory, viz., $(45 + \phi/2)$. This finding suggests an isotropic reinforcing action with no development of preferred of planes weakness or strength. 2) The failure envelopes in our tests were either curved-linear or bilinear with the transition or break occurring at a confining stress denoted as the 'critical confining stress', sigma crit. 3) An increase in fiber aspect ratio, L/D, resulted in a lower sigma crit, and more effective fiber contribution to increase shear strength. 4) An increase in fiber amount or weight fraction, had no effect on sigma crit but it did influence strength significantly. 5) Shear strength increases approximately linearly with increasing amounts of fiber and then approaches an asymptotic upper limit that is governed mainly by confining stress and fiber aspect ratio. 6) Very low modulus fibers (e.g., rubber) contribute little to increased strength in spite of superior pullout resistance (low sigma crit). 7) An increase in soil gradation resulted in lower sigma crit, and higher fiber contribution to strength (all other factors constant). 8) An increase in particle sphericity resulted in a higher sigma crit and lower fiber contribution to strength (all other factors constant). 9) An increase in soil grain size, D50, had no effect on

AD-A200 524

AD-A200 524

sigma crit; however, it reduced the fiber contribution to strength (all other factors constant). Keywords: Soil stabilization; Earth reinforcement. (EDC)

DESCRIPTORS: (U) *FIBER REINFORCEMENT, *SAND, *SOIL STABILIZATION, ASPECT RATIO, COMPRESSION, FAILURE(MECHANICS), FIBERS, GRAIN SIZE, ISOTROPISM, PARTICLE SIZE, REINFORCING MATERIALS, RUBBER, SHEAR STRENGTH, SOIL MECHANICS, SOILS, STRENGTH(MECHANICS), STRESSES, SURFACES, TEST AND EVALUATION, TRIAXIAL STRESSES.

IDENTIFIERS: (U) Fiber reinforced sand, PE81102F, WUAFOSR2302C1.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 511 12/3

AD-A200 510 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Tail Behaviour for the Suprema of Gaussian Processes
with Applications to Empirical Processes.

(U) On a Wide Range Exclusion Process in Random Medium
with Local Jump Intensity.

DESCRIPTIVE NOTE: Technical rept.,

DESCRIPTIVE NOTE: Technical rept. no. 236, Sep 87-Aug 88,

87

AUG 88

PERSONAL AUTHORS: Adler, Robert J.; Samorodnitsky,
Gernady

PERSONAL AUTHORS: Platen, E.

REPORT NO. TR-127

CONTRACT NO. F49620-85-C-0144

CONTRACT NO. F49620-85-C-0144, \$AFOSR-85-0384

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A6

TASK NO. A6

MONITOR: AFOSR
TR-88-1061

MONITOR: AFOSR
TR-88-1058

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Annals of Probability, v15 n4
p1339-1351 1987.

ABSTRACT: (U) The paper investigates the macroscopic
nonequilibrium dynamics of a wide range exclusion process
in random medium. Bases on a law of large numbers and the
specific properties of the exclusion dynamics it is shown
under suitable assumptions that the particles
concentration follows a nonlinear evolution equations.
Keywords: Exclusion process; Interacting particle system;
Nonequilibrium dynamics; Nonlinear evolution equation.
(jhd)

DESCRIPTORS: (U) *STATISTICAL PROCESSES, *ENTROPY,
LINEARITY, HILBERT SPACE, BIVARIATE DENSITY FUNCTIONS,
MATHEMATICAL MODELS, COVARIANCE.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, DYNAMICS,
EVOLUTION(GENERAL), INTENSITY, INTERACTIONS,
NONEQUILIBRIUM FLOW, NONLINEAR ALGEBRAIC EQUATIONS,
NONLINEAR SYSTEMS, PARTICLES, RANGE(EXTREMES).

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A6, GAUSSIAN
PROCESSES, TAIL BEHAVIOR, *BROWNIAN SHEETS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A6, Jump processes,
Exclusion process.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 506

7/5

AD-A200 506 CONTINUED

DARTMOUTH COLL HANOVER N H DEPT OF CHEMISTRY

(U) Competition among Collisional Deactivation, Ionization, and Dissociation in the Multiphoton Excitation of Octafluorocyclooctatetraene.

88

PERSONAL AUTHORS: Belbruno, Joseph J.; Greenfield, Scott R.; Carl, Richard T.; Hughes, Russell P.

CONTRACT NO. AFOSR-88-0075

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-88-1075

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v92 n9 p2480-2484 1988.

ABSTRACT: (U) The gas-phase UV multiphoton induced chemistry and multiphoton ionization of octafluorocyclooctatetraene (OFCCOT) have been examined as a function of laser pulse energy, laser wavelength, and background gas pressure. The production of hexafluorobenzene (HFB), tetrafluoroethylene (TFE), and tetrafluoromethane (TFM) as well as carbon has been observed. An intense fluorescence has also been recorded and attributed to the Swan bands of Carbon2. The laser intensity dependent bulk kinetics of the OFCCOT decomposition were found to be first order. Qualitative aspects of the photochemistry of HFB and TFE, under identical conditions, are also reported. The addition of N2 to the sample is shown to increase the rate of photolysis and decrease the MPI current. This observation is attributed to the competition between ionization and dissociation from the initially created valence state of the target molecule. The increase in the number of collisions results in a larger fraction of excited-state molecules undergoing relaxation to states which are either geometrically or energetically unfavorable with respect to ionization. The result, therefore, is an increase in the yield of the dissociation products. A

simple kinetic rate equation model is in agreement with these observations. OFCCOT appears to be a member of a unique group of large, organic molecules exhibiting this type of competition. Reprints. (aw)

DESCRIPTORS: (U) *IONIZATION, *PHOTOCHEMICAL REACTIONS, BACKGROUND, CARBON, COLLISIONS, DEACTIVATION, DECOMPOSITION, DISSOCIATION, ENERGY, EXCITATION, FLUORESCENCE, FREQUENCY, GASES, HEXAFLUOROBENZENE, INTENSITY, LASERS, MOLECULES, ORGANIC COMPOUNDS, PHOTOIONIZATION, PHOTOLYSIS, PHOTONS, PRESSURE, PRODUCTION, PULSED LASERS, RATES, REPRINTS, TARGETS, VALENCE.

IDENTIFIERS: (U) PEG1102F, WJAFDSR230382.

AD-A200 506

AD-A200 506

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 445 12/9

MARYLAND UNIV COLLEGE PARK

(U) Connectionist Models for Intelligent Computation.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 87-31 Aug 88.

AUG 88

PERSONAL AUTHORS: Chen, H. H.; Lee, Y. C.

CONTRACT NO. AFOSR-87-0388

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-88-1157

UNCLASSIFIED REPORT

ABSTRACT: (U) We have continued our study of higher order neural networks. The superior processing power capacity and speed of the higher order neural network has been demonstrated for many tasks including text to speech, character recognitions, noise removal, time series prediction etc. Currently, we are applying it to the speech recognition problem. We have constructed a neural network to learn the task of stereopsis from random dot stereogram. The connection weights of the network are computed analytically from the Hebbian learning rule. The results show that the continuity and uniqueness constraints first proposed by Marr and Poggio are learned automatically. We proposed a novel scheme (PSIN) to automatically build a neural network while learning. The new scheme takes advantage of both the parallel and sequential strategies to solve a pattern classification or decision problem. We optimize an entropy measure to encourage the network to extract the best feature first to classify the pattern. Preliminary test of this new scheme shows that PSIN performs superior than the back propagation scheme in hard problems. (KR)

DESCRIPTORS: (U) *NEURAL NETS, CLASSIFICATION, COMPUTATIONS, DECISION MAKING, ENTROPY, NETWORKS, NOISE, PATTERNS, PREDICTIONS, PROCESSING, PROPAGATION, SEQUENCES, SPEECH RECOGNITION, STEREOSCOPES, STRATEGY, TIME SERIES

AD-A200 445

UNCLASSIFIED

AD-A200 445

PAGE 15

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 397 CONTINUED

AD-A200 397 11/2 20/11 14/2

MICHIGAN UNIV ANN ARBOR DEPT OF CIVIL ENGINEERING

AND EVALUATION, THERMAL PROPERTIES, UNIVERSITIES.

(U) Non Contacting Evaluation of Strains and Cracking
Using Optical and Infrared Imaging Techniques.

IDENTIFIERS: (U) WJAFOSR2917A1, PE81102F.

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-1 Jun 88.

AUG 88

PERSONAL AUTHORS: Naaman, A. E.

CONTRACT NO. AFOSR-88-0314

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR
TR-88-1118

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant was issued under the DOD University Research Instrumentation Program. Two new test systems were purchased and set-up: a thermovision system and a non contacting three dimensional motion measuring system. The first system consists of an infrared scanner, supported by a video recorder, a thermal image computer, corresponding software and other peripherals. It is being used as a non-contact non-destructive technique to analyse the mechanical response of and crack initiation in concrete under specified loading. The second system is a high accuracy three dimensional motion tracking, digitizing and analysis system. It essentially consists of two high resolution infrared dual axis sensors (cameras), a camera controller unit, a microcomputer, a data acquisition unit, and related software. This system can track the coordinates of up to 84 individual marker points placed on a test specimen with a frequency of 5000 hertz at accuracies of a fraction of a millimeter. (RH)

DESCRIPTORS: (U) *CAMERAS, *CRACKING(FRACTURING), *DATA PROCESSING EQUIPMENT, *INFRARED IMAGES, *INFRARED SCANNING, *INSTRUMENTATION, *NONDESTRUCTIVE TESTING, *THERMOVISION, *VIDEO RECORDING, ACCURACY, COMPUTER PROGRAMS, COMPUTERS, CONCRETE, CONTROL, CRACKS, DATA ACQUISITION, IMAGES, MECHANICAL PROPERTIES, METHODOLOGY, MICROCOMPUTERS, OPTICAL IMAGES, OPTICS, RESPONSE, TEST

AD-A200 397

AD-A200 397

UNCLASSIFIED

PAGE 18

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 376 CONTINUED

SCIENTIFIC RESEARCH ASSOCIATES INC GLASTONBURY CT

(U) Studying Quantum Phase-Based Electronic Devices.

ELECTRONICS, *ELECTRIC CHARGE, ACCUMULATION, BARRIERS,
BIAS, MOMENTS, POISSON EQUATION, QUANTUM THEORY,
STABILITY, TRANSPORT.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 87-15 Jul 88,

IDENTIFIERS: (U) PE01102F, WUAF0SR2308B1.

SEP 88

PERSONAL AUTHORS: Grubin, H. L.; Kreskovsky, J. P.

REPORT NO. R910023-1

CONTRACT NO. F48620-87-C-0055

PROJECT NO. 2308

TASK NO. 81

MONITOR: AFOSR
7R-88-1088

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes work confined to use of the moments of the density matrix, for examining transport in quantum phase based devices. There are two significant features of the approach: (1) the introduction of Bohm's quantum potential, and (2) the use of moment equations which are self-consistently coupled to Poisson's equation. There were a number of significant approximations made during this reporting period that are currently being eliminated: (1) Only two of the minimum of three moment equations have been implemented. (2) Boltzmann statistics was invoked. The results show for a double barrier structure with 500 Angstrom spacer-layers considerable structure in the charge distribution. At low values of bias and corresponding low values of current there is a buildup of charge upstream of the first barrier. As well as tunnelling into the well. At a critical value of bias a local instability of current occurs and the solutions shows a qualitative difference. Accumulation at the upstream barrier is only marginally altered, and there is a significant charge buildup in the well. The instability appears to be a precursor for this charge buildup. Keywords: Quantum potential, Density matrix, Resonant tunnelling. (jhd)

DESCRIPTORS: (U) *TUNNELING(ELECTRONICS), *QUANTUM

AD-A200 376

AD-A200 376

UNCLASSIFIED

PAGE 17

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 375 6/10

AD-A200 375 CONTINUED

WORCESTER FOUNDATION FOR EXPERIMENTAL BIOLOGY SHREWSBURY MASS
IDENTIFIERS: (U) PEG1102F, WUAFOSR2312A2.

(U) Regulation of Voltage-Dependent Channel Function.

DESCRIPTIVE NOTE: Final rept. 1 Jan 85-31 May 88.

AUG 88

PERSONAL AUTHORS: Treisman, Steven N.

CONTRACT NO. AFOSR-85-0082

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
W-88-1081

UNCLASSIFIED REPORT

ABSTRACT: (U) Using fluorescent photobleaching recovery techniques, it was found that the diffusion coefficient of lipid probes within neuronal membranes of Aplysia were temperature insensitive. However, the percent of the probe free to migrate changed as a function of temperature. The temperature sensitivity of A-currents were much greater than those of calcium currents in the same cell. Among the multiple classes of A-current channels some showed significant changes in acute temperature sensitivity as a result of temperature history of the animal while others exhibited no change. The A-current channels some showed significant changes in acute temperature sensitivity as a result of temperature history of the animal while others exhibited no change. The was absent at low temperatures regardless of the rearing temperature of the animal, but grew significantly at temperatures warmer than those at which the animals were raised. It is hypothesized that this A-current acts to inhibit neuronal discharge at high rates during warming. (RH)

DESCRIPTORS: (U) *APLYSIA, *CALCIUM, *CURRENTS, *MEMBRANES, *NERVE CELLS, *PROBES, *ANIMALS, DIFFUSION COEFFICIENT, HEATING, HIGH RATE, HISTORY, LIPIDS, LOW TEMPERATURE, SENSITIVITY, TEMPERATURE.

AD-A200 375

AD-A200 375

UNCLASSIFIED

PAGE 18

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 374 6/4

AD-A200 374 CONTINUED

COLORADO UNIV AT BOULDER

(U) Behavioral Consequences of Neurotransmitter Regulation.

DESCRIPTIVE NOTE: Final rept. 15 Sep 85-14 Sep 88.

SEP 88

TRANSMISSION, *PHARMACOLOGY, ACQUISITION, ACTIVATION,
CHOLINERGIC NERVES, CHOLINESTERASE INHIBITORS, COMPARISON,
LEARNING, MARKERS, MICE, MUSCARINE, NERVE TRANSMISSION,
RECEPTION, REGULATIONS, SENSE ORGANS, SPACE PERCEPTION,
SPATIAL DISTRIBUTION, STRAINS(BIOLOGY).

IDENTIFIERS: (U) PE81102F, WJAFOSR2312A2.

PERSONAL AUTHORS: Wehrer, Jeanne M.

CONTRACT NO. AFOSR-85-0389

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-1092

UNCLASSIFIED REPORT

ABSTRACT: (U) Spatial learning ability using the Morris water task was assessed in inbred strains of mice. After initial characterization, two strains were selected to perform studies, C57BL mice which performed the task well, and DBA/2J mice which were impaired in their performance. A comparison of cholinergic markers indicated a significant difference between these two strains in acetylcholinesterase activity and in hippocampal protein kinase activity. The difference in protein kinase activity appears to relate to their differing learning ability because a significant correlation between learning ability and hippocampal protein kinase C activity was observed in recombinant inbred strains generated from a cross of C57BL and DBA/2J mice. Additional pharmacological studies were performed in which cholinergic receptors were manipulated by either chronic treatment with an anticholinesterase or an agonist. Such treatments produced a decrease in muscarinic receptors and an impairment in acquisition of spatial learning. These studies demonstrate that cholinergic systems are important during initial acquisition of spatial learning and that coupling of receptors via activation of protein kinase C activity may be an important determinant of learning ability. Keywords: Neurotransmitters; Learning. (kt)

DESCRIPTORS: (U) *ACETYLCHOLINESTERASE, *NEUROMUSCULAR

AD-A200 374

AD-A200 374

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 372 20/6 20/3

AD-A200 371 7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF CHEMISTRY

(U) Optical Beam Phase-Conjugation and Electromagnetic Scattering Process with Intense Fields.

(U) The Reactivity of Transition Metal-Silicon Compounds.

DESCRIPTIVE NOTE: Final rept. 3 Dec 82-2 Dec 87,

DESCRIPTIVE NOTE: Final rept. 1 Jun 85-31 May 88,

AUG 88

MAY 88

PERSONAL AUTHORS: Tilleay, T. D.

PERSONAL AUTHORS: Hellwarth, Robert W.

CONTRACT NO. AFOSR-85-0228

CONTRACT NO. F49620-83-C-0045

PROJECT NO. 2303

PROJECT NO. 2301

TASK NO. 82

TASK NO. A1

MONITOR: AFOSR

MONITOR: AFOSR
TR-88-1085

TR-88-1088

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This project performed both theoretical and experimental studies of optical beam phase-conjugation and electromagnetic scattering processes with intense optical fields. New bounds are established on the power and energy required to perform useful wave mixing in certain classes of nonlinear media. New physical processes are discovered for optical beam phase conjugation. The first complete physical characterizations of monopolar and bipolar photorefractive crystals is performed. Keywords: Optical beam phase conjugation; Nonlinear optics; High power; Optical beam propagation; Photorefractive effect. (Jnd)

DESCRIPTORS: (U) *ELECTROMAGNETIC SCATTERING, *LIGHT TRANSMISSION, *REFRACTION, BEAMS(RADIATION), EXPERIMENTAL DATA, HIGH POWER, INTENSITY, MEDIA, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, OPTICS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1, *Nonlinear optics, Phase conjugation.

ABSTRACT: (U) The objective of this work was to synthesize and study early-transition-metal silyl compounds that have the potential to carry out novel chemical transformations and to serve as precursors to solid-state materials containing both silicon and an early-transition-metal. We discovered several routes to new early-transition-metal silyl complexes. These complexes contain $-\text{SiMe}_3$, $-\text{Si}(\text{SiMe}_3)_3$ and $-\text{Si}(\text{Mes})_2$ ($\text{Mes}=\text{mesityl}$) silyl groups. These new complexes, of scandium, zirconium, hafnium, niobium and tantalum, have been characterized by a variety of spectroscopic techniques, including x-ray crystallography. Reactivity studies with these new complexes establish basic reactivity patterns toward a range of reactants. Unusual reactions that were discovered for these M-Si bonds include: reductive elimination of silyl groups with chloride, first observation of Carbon Monoxide insertion into a transition-metal-silicon bond, routes to the first stable formylsilane, $(\text{Me}_3\text{Si})_3\text{SiCHO}$, facile ether cleavage following CO/CO coupling by a tantalum-silicon bond, formation of tetrahedral Lewis base adducts of $\text{M}(\text{eta}-(2-\text{COSiR}_3))$ silylacyl complexes, insertion of organic carbonyls into a tantalum-silicon bond with nucleophilic silyl group transfer, and facile photochemical and thermal insertions of ethylene into metal-silicon bonds. (aw)

AD-A200 372

AD-A200 371

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 371 CONTINUED

AD-A200 369 20/5

DESCRIPTORS: (U) *TRANSITION METAL COMPOUNDS, *SILICON COMPOUNDS, *ORGANOMETALLIC COMPOUNDS, CHEMICAL BONDS, CHEMICALS, CHLORIDES, CRYSTALLOGRAPHY, ETHYLENE, HAFNIUM, MATERIALS, METALS, NIOBIUM, OBSERVATION, PATTERNS, PRECURSORS, REACTANTS(CHEMISTRY), REACTIVITIES, SCANDIUM, SILICON, SOLID STATE ELECTRONICS, SPECTROSCOPY, TANTALUM, TRANSFORMATIONS, X RAYS, ZIRCONIUM.

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Trajectory Studies of Unimolecular Reactions of Si2H4 and SiH2 on a Global Potential Surface Fitted to Ab Initio and Experimental Data.

JUL 88

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B2.

PERSONAL AUTHORS: Agrawal, Paras M.; Thompson, Donald L.; Raff, Lionel M.

CONTRACT NO. AFOSR-86-0043

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-1128

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v89 n2 p741-750, 15 Jul 88.

ABSTRACT: (U) The unimolecular decomposition dynamics of Silicon Hydride have been investigated using classical trajectory methods on a global potential-energy surface fitted to the results of ab initio calculations and the available experimental data. The required phase-space averages are computed using Metropolis sampling techniques. It is found that unless the parameters of the Markov walk are adjusted for each different type of atom present, extremely long Markov walks are required to adequately cover the phase space of the system. The most important dissociation channel over this energy range is three-center elimination of molecular hydrogen leading to H2Si=Si. At energies below 7.0 eV, the other channels are, in order of importance, Si-Si bond rupture, four-center H2 elimination, and simple Si-H bond rupture. At or above 8.0 eV, four-center H2 elimination replaces Si-Si bond rupture as the second most important decomposition channel. (jes)

DESCRIPTORS: (U) *REACTION KINETICS, *TRAJECTORIES, ATOMS, CHANNELS, DECOMPOSITION, DISSOCIATION, DYNAMICS, ENERGY, EXPERIMENTAL DATA, GLOBAL, HYDRIDES, HYDROGEN, MOLECULES, SILICON, SURFACES, ELIMINATION REACTIONS.

AD-A200 371

AD-A200 369

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 389 CONTINUED

AD-A200 388 12/3

MISSOURI UNIV-ROLLA DEPT OF MATHEMATICS AND STATISTICS

IDENTIFIERS: (U) PE81102F, WJAFOSR230383, *UNIMOLECULAR REACTIONS, SILICON HYDROGEN BOND RUPTURE.

(U) Test of Equal Gamma-Distribution Means with Unknown and Unequal Shape Parameters.

MAY 88

PERSONAL AUTHORS: Shiue, Wei-Kel; Bain, Lee J.; Engelhardt, Max

CONTRACT NO. AFOSR-84-O184

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-88-1130

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. In Technometrics, v30 n2 p189-174 May 88.

ABSTRACT: (U) An approximate F-test is provided for testing the equality of means for two gamma distributions when the shape parameters may be unknown and unequal. The corresponding confidence intervals associated with this test provide confidence intervals for the ratio of means when the shape parameters are unknown and unequal. The approximation is studied by Monte Carlo simulation and asymptotic results are also derived. An approximate F-test for equal shape parameters is also studied. Keywords: Reprints; Equality of means; Confidence intervals; Two sample tests; Ratios of means. (JHD)

DESCRIPTORS: (U) *CONFIDENCE LIMITS, *STATISTICAL DISTRIBUTIONS, INTERVALS, MONTE CARLO METHOD, PARAMETERS, RATIOS, REPRINTS, SHAPE, SIMULATION.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A8, Gamma distribution, Two sample test, Ratio of means.

AD-A200 389

AD-A200 388

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 367 7/8 20/8

AD-A200 366 7/8 20/8 11/9 7/3

UNIVERSITY OF SOUTHERN MISSISSIPPI HATTIESBURG

UNIVERSITY OF SOUTHERN MISSISSIPPI HATTIESBURG

(U) Pyridine N-Oxides as Polymeric Nonlinear Optical Materials.

(U) Synthesis of Side Chain Liquid Crystal Polymers for Nonlinear Optics.

88

88

PERSONAL AUTHORS: Griffin, Anselm C.; Bhatti, Amjad M.; Howell, Greg A.

PERSONAL AUTHORS: Griffin, Anselm C.; Bhatti, Amjad M.; Hung, Robert S.

CONTRACT NO. AFDSR-84-0249

CONTRACT NO. AFOSR-84-0249

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. A3

TASK NO. A3

MONITOR: AFOSR TR-88-1124

MONITOR: AFOSR TR-88-1134

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Materials Research Society Symposium Proceedings, Vol 9 p115-125 1988.

SUPPLEMENTARY NOTE: Pub. in SPIE, V682-Molecular and Polymeric Optoelectronic Materials: Fundamentals and Applications, p85-89 1988.

ABSTRACT: (U) Three polymers containing pyridine N-oxide imine pendant moieties were prepared and examined. Although the appropriate low molar mass model compound is liquid crystalline, the polymers are not mesogenic. Two of them form fibers and clear, transparent glasses. Side reactions involving the N-oxide group during polymerization are postulated as leading to the lack of mesomorphism in these materials although the chromophore remains essentially intact for the bulk of the material as judged by UV-Vis and other spectral data. They may have NLO application as poled polymeric glasses. Keywords: Nonlinear optical materials; Pyridine N-oxides. (jes)

ABSTRACT: (U) Side chain liquid crystalline polymers offer unique advantages as a new class of organic materials with potential for nonlinear optical (nlo) response. Design and synthesis of a series of nitroaromatic side chain liquid crystalline polyesters was carried out employing the concept of having the nitroaromatic species serve concomitantly as both the nonlinear optical chromophore and as the (only) liquid crystalline moiety in the polymer. Reprints. (AW)

DESCRIPTORS: (U) *OPTICAL MATERIALS, *POLYMERIZATION, BULK MATERIALS, GLASS, LIQUID CRYSTALS, NONLINEAR SYSTEMS, POLYMERS, SIDE REACTIONS, SPECTRA, TRANSPARENCY.

DESCRIPTORS: (U) *AROMATIC COMPOUNDS, *NITROGEN COMPOUNDS, *POLYESTER PLASTICS, *LIQUID CRYSTALS, *OPTICAL MATERIALS, NONLINEAR SYSTEMS, OPTICS, ORGANIC MATERIALS, REPRINTS, SYNTHESIS(CHEMISTRY), CHROMOPHORES.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303A3.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303A3.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 385 7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES LOKER
HYDROCARBON RESEARCH INST

(U) Diels-Alder Reactions of 1,1-dimethyl-2,3,4,5-tetraphenyl-1-silacyclopentadiene, 1,1-dimethyl-2,5-diphenyl-1-silacyclopentadiene and 1,1-dimethyl-3,4-diphenyl-1-silacyclopentadiene with Maleic Anhydride; Kinetic Measurements,

88

PERSONAL AUTHORS: Henry, George K.; Shinimoto, Ronald; Zhou, Qingshan; Weber, William P.

CONTRACT NO. AFOSR-88-0042

PROJECT NO. 6813, 9538

TASK NO. 03

MONITOR: AFOSR
TR-88-1135

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v350 p3-8 1988

ABSTRACT: (U) Diels-Alder reactions of 1,1-dimethyl-2,3,4,5-tetraphenyl 1-1-silacyclopentadiene, 1,1-dimethyl-2,5-diphenyl-1-silacyclopentadiene and 1,1-dimethyl-3,4-diphenyl-2-silacyclopentadiene with maleic anhydride have been carried out. The rates of these second order reactions have been measured by Hydrogen Fourier Transform Nuclear Magnetic Resonance over a range of temperatures. Arrhenius plots of these data yield the activation parameters for these reactions. The synthesis of 1,1-dimethyl-3,4-diphenyl-1-silacyclopentadiene is reported. Reprints. (AW)

DESCRIPTORS: (U) *DIENE SYNTHESIS, *PENTADIENES, ACTIVATION, ARRHENIUS EQUATION, KINETICS, MEASUREMENT, PARAMETERS, REPRINTS, TEMPERATURE, YIELD, METHYL RADICALS, PHENYL RADICALS, SILICON COMPOUNDS, CYCLIC COMPOUNDS, MALEIC ACID, ANHYDRIDES.

IDENTIFIERS: (U) PE81102F, WUAFOSR681303, Diels Alder reactions.

AD-A200 385

AD-A200 383 9/1

MINNESOTA MINING AND MFG CO ST PAUL

(U) Polymeric Heterostructure Thin Films,

88

PERSONAL AUTHORS: Egbert, W. C.; Gerbi, D. J.; Ender, D. A.; Stevens, J.

CONTRACT NO. F49620-88-C-0088

PROJECT NO. D812

TASK NO. J1

MONITOR: AFOSR
TR-88-1036

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SPIE, v878-Multifunctional Materials p113-122 1988.

ABSTRACT: (U) The nonlinear optical response of organic and polymeric materials arises from the polarization response of delocalized electrons. The susceptibility χ squared or χ cubed is the macroscopic observable tensor sum of the molecular hyperpolarizabilities B or γ , including the effects of molecular response and orientation within the sample. A two-dimensional thin film provides a different local environment for the electrons responsible for the fast (femtosecond) purely electronic optical nonlinearity of organic materials from three-dimensional analogues. Langmuir-Blodgett thin film technology is well suited to production of two-dimensional films and layered structures incorporating molecules, even with different nonlinear optical properties in each layer. This paper describes a program for fabrication and evaluation of organic heterostructure thin films by the Langmuir-Blodgett technique for applications to nonlinear optics. Keywords: Nonlinear optical activity; Langmuir-Blodgett films; Merocyanine dye; Chloronitroaniline. (jes)

DESCRIPTORS: (U) *THIN FILMS, CYANINE, DYES, ELECTRONICS, ELECTRONS, ENVIRONMENTS, FILMS, LAYERS, MATERIALS, MERCURY COMPOUNDS, MOLECULES, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, OPTICS, ORGANIC MATERIALS, POLARIZATION,

AD-A200 383

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 363 CONTINUED

AD-A200 362 7/5 20/5

POLYMERS, PRODUCTION, RESPONSE, STRUCTURES, TWO
DIMENSIONAL.

MINNESOTA MINING AND MFG CO ST PAUL

IDENTIFIERS: (U) PE81102F, WUAFOSRD812J1.

(U) Line Shape of an Atom-Crystal Bond,

JUL 88

PERSONAL AUTHORS: Arnoicus, Henk F.; George, Thomas F.

CONTRACT NO. F49820-88-C-0008

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-1030

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review B, v38 n2
p878-886, 15 Jul 88.

ABSTRACT: (U) The spectra profile for the absorption of infrared laser light by a vibrational bond between a physiosorbed atom and a harmonic crystal is calculated. We obtained an analytical expression for the line shape, which includes the finite memory-time effects in the interaction between atomic motion and bulk-atom vibrations. Both the memory in the time regression of the dipole correlation function and the initial correlations are taken into account. It is shown that absorption from a laser with a frequency which is larger than the cutoff frequency Ω sub D of the dispersion relation of the crystal can only occur due to a memory in the relaxation process, provided that multiphonon transitions are negligible. We predict a resonance-like line at Ω sub D + Ω sub D (with Ω sub D the unperturbed resonance) for atom-surface bonds with a permanent dipole moment. Reprints. (AW)

DESCRIPTORS: (U) *CHEMICAL BONDS, *LINE SPECTRA, *RADIATION ABSORPTION, *LASER BEAMS, ABSORPTION, ATOMS, CORRELATION, CRYSTALS, DIPOLE MOMENTS, DIPOLES, DISPERSION RELATIONS, FUNCTIONS(MATHEMATICS), HARMONICS, INFRARED LASERS, INFRARED RADIATION, LASERS, PHONONS, PROFILES, REGRESSION ANALYSIS, RELAXATION, REPRINTS, SHAPE, SPECTRA, SURFACES, TIME, TRANSITIONS, VIBRATION.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 382

CONTINUED

AD-A200 361

20/2

IDENTIFIERS: (U) PEG1102F, WUAFOSR230383, Atom crystal
bonds, Atom molecule interactions.

MINNESOTA MINING AND MFG CO ST PAUL

(U) Intermolecular Interactions and Crystal Stabilities of
Tetrathiafulvalene-tetracyanoquinodimethane,

88

PERSONAL AUTHORS: Stevens, J.; Leung, P. C.; Chou, S. H.;
Freeman, A. J.; Wimmer, E.

CONTRACT NO. F49620-88-C-0008

PROJECT NO. D812

TASK NO. J1

MONITOR: AFOSR
TR-88-1040

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SPIE, V878-Multifunctional
Materials p131-135 1988.

ABSTRACT: (U) The crystal structure of the organic
conductor derived from tetrathiafulvalene (TTF) and
tetracyanoquinodimethane (TCNQ) is composed of segregated
stacks of donor (TTF) and acceptor (TCNQ) molecules and
ions. Charge transfer from donor to acceptor stacks gives
a stable crystal where ions of the same charge pack with
parallel molecular planes at short intermolecular
distances. An ab initio quantum mechanical calculation
using a 6-31G** basis set and the DMOL method has been
carried out to examine the intermolecular bonding and
Coulombic interactions in this crystal. Molecular
relationships at the calculated energy minima are close
to the observed crystal structure. Formation of extended
intermolecular orbitals within each type of stack
correlates with the intermolecular bonding which appears
to be present in this material as shown by the short
interplanar distances. Keywords: Crystal packing;
Intermolecular interactions; Organic conductors. (jes)

DESCRIPTORS: (U) *CRYSTAL STRUCTURE, BONDING, CHARGE
TRANSFER, COMPUTATIONS, CONDUCTIVITY, CRYSTALS, ELECTRON
ACCEPTORS, INTERACTIONS, IONS, MOLECULE MOLECULE
INTERACTIONS, MOLECULES, ORGANIC MATERIALS, PACKAGING,
QUANTUM THEORY, SHORT RANGE(DISTANCE), STABILITY.

AD-A200 382

AD-A200 361

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 361 CONTINUED

AD-A200 360 11/2

STACKING.

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

IDENTIFIERS: (U) PE81102F, WUAFOSR0812J1,
*TETRATHIAFULVALENE-TETRACYANOQUINODIMETHANE.

(U) Chemical Processing of Structural Ceramics and Composites.

DESCRIPTIVE NOTE: Final rept. 15 Jul 85-15 Sep 88.

SEP 88

CONTRACT NO. F49620-85-C-0118

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0889

UNCLASSIFIED REPORT

ABSTRACT: (U) Chemical processing of ceramics has drawn considerable attention in recent years. This is mainly due to the realization that by controlling the structures, surfaces, and interfaces of materials at the molecular level, one can achieve high performance ceramic components or devices, in the earliest stages of processing. Exploratory, experimental, and analytical investigations have been conducted on the following subjects through chemical processing: synthesis and application of organosilicon polymers, sol-gel processing of multi-component metal oxide systems, and chemical processing of high temperature oxide superconductors. Summarized are major findings and the most recent and relevant additional results have also been included in this report. In addition to these, a number of publications have resulted from these investigations and are attached in the Appendix. Keywords: Thin films; Superconductors. (kt)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *CHEMICAL ENGINEERING, CHEMICALS, HIGH TEMPERATURE, INTERFACES, METALS, MOLECULAR STATES, ORGANIC COMPOUNDS, OXIDES, POLYMERS, PROCESSING, SILICON COMPOUNDS, STRUCTURAL PROPERTIES, SUPERCONDUCTORS, SYNTHESIS, THIN FILMS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, LPN-UES-856.
*Chemical processing.

AD-A200 361

AD-A200 360

UNCLASSIFIED

PAGE 27

EVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 358

7/3

PRINCETON UNIV NJ DEPT OF CHEMISTRY

(U) Summary Abstract: The Adsorption and Decomposition of Molybdenum Hexacarbonyl on Mo and Si Surfaces.

AUG 87

PERSONAL AUTHORS: Cho, C.-C.; Bernasek, S. L.

CONTRACT NO. AFOSR-85-0206

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-88-1028

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Vacuum Science and Technology A, V5 n4 p1088-1090 Jul-Aug 87.

ABSTRACT: (U) The adsorption and reactive properties of organometallic compounds on surfaces have attracted increasing attention recently, due to potential applications within the diverse fields of heterogeneous catalysis and semiconductor device technologies. 1,2 Using x-ray photoelectron spectroscopy (XPS), Auger electron spectroscopy (AES), and thermal desorption spectroscopy (TDS), we have investigated the adsorption and decomposition of Molybdenum Hexacarbonyl (Mo(Co)8) on Mo and Si surfaces. Processes occurring during thermal, UV photolytic, and electron induced deposition have been studied. Keywords: Surface reactions; Organic chemistry. (kt)

DESCRIPTORS: (U) *ADSORPTION, *ORGANOMETALLIC COMPOUNDS, AUGER ELECTRON SPECTROSCOPY, CATALYSIS, DEPOSITION, DESORPTION, ELECTRONS, HETEROGENEITY, ORGANIC CHEMISTRY, REACTIVITIES, SEMICONDUCTOR DEVICES, SPECTROSCOPY, SURFACE REACTIONS, THERMAL RADIATION, X RAY PHOTOELECTRON SPECTROSCOPY.

IDENTIFIERS: (U) PEB1102F, WUAOFSR2303A2.

AD-A200 358

AD-A200 357 20/5 7/4

SRI INTERNATIONAL MENLO PARK CA

(U) State-Specific Energy Transfer in Diatomic Radicals.

DESCRIPTIVE NOTE: Final rept. 1 May 85-1 Jun 88.

AUG 88

PERSONAL AUTHORS: Crosley, David R.; Copeland, Richard A.; Jeffries, Jay B.

REPORT NO. SRI-MP-88-205

CONTRACT NO. F49670-85-K-0010

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0895

UNCLASSIFIED REPORT

ABSTRACT: (U) Quantum-state-specific collisional energy transfer has been studied in the N atoms, and the Hydroxyl and Nitrogen Sulfur diatomic radicals. Vibrational energy transfer (VET) in the A(2) Sigma(+) state of OH was found to depend on rotational level. Rotational energy transfer in A shows unusual propensities. The final vibrational level distribution following quenching of A(2) Sigma(+) is not governed by Franck-Condon considerations. VET in X(2) Pi Sub 1 OH generally proceeds much faster than in A. Delta J - 1 transfer is fastest among the spin-orbit components of the 3p(4) D(0) state of N. Quenching of B(2) Pi NS varies with vibrational level differently depending on collider. The amount of Delta V - 2 VET compared with Delta V - 1 also depends on v and collider. Keywords: Molecule. Molecule interactions, Laser induced fluorescence. (mjw/aw)

DESCRIPTORS: (U) *DIATOMIC MOLECULES, *ENERGY TRANSFER, *HYDROXYL RADICALS, *NITROGEN, *SULFUR, ATOMS, CHEMICAL RADICALS, INTERACTIONS, LASER INDUCED FLUORESCENCE, LEVEL(QUANTITY), MOLECULES, ORBITS, ROTATION, SPINNING(MOTION), VIBRATION.

AD-A200 357

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 357 CONTINUED

AD-A200 358 9/1 11/4 11/7 11/8.1

IDENTIFIERS: (U) PE61102F, WUAFOSR22303B1, LPN-SRI-PYU-8707.

SRI INTERNATIONAL MENLO PARK CA

(U) Semiconductor Alloy Engineering for High-Speed Devices.

DESCRIPTIVE NOTE: Final rept. May 85-Aug 88.

AUG 88

PERSONAL AUTHORS: Sher, A.; Krishnamurthy, S.; Chen, A.-B.

CONTRACT NO. F49820-85-C-0103, \$ARPA Order-5398

PROJECT NO. 2308

TASK NO. B1

MONITOR: AFOSR
TR-88-0981

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Auburn Univ., AL.

ABSTRACT: (U) In the last ten years, high-speed (10- to 100-Gigahertz) devices have been tested in myriad operating modes and geometries. The goal of these efforts have been to develop efficient discrete elements that can be readily fabricated into reliable systems with high production yield. While the tried and true silicon semiconductor continues to be the workhorse of the industry, its relatively high effective mass begins to make it less attractive than some of the III-V compounds (e.g., GaAs, InP, and certain alloys) once design frequencies are high. Many of the new device designs call for heterojunctions (e.g., tunneling junctions in hot electron transistors), high mobility channels (e.g., quantum well structures) and other special characteristics. The question of optimum materials selection for these multiterminal structures is nontrivial. In this report, we address only a subset of questions bearing on materials selection; however, these questions are central to high-speed performance. The major question is, which materials offer the best set of performance-limiting parameters for the device's active transport region (usually the base)? The number of possible materials from which to select is enormous: the compounds and alloys made from the cations, aluminum,

AD-A200 357

AD-A200 358

UNCLASSIFIED

PAGE 25

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 356 CONTINUED

gallium, indium, and the anions phosphorous, arsenic, and antimony. Thus, predictions of an accurate theory can serve to reduce greatly the number of experiments needed to optimize performance. Keywords: Semiconductors.

DESCRIPTORS: (U) *ALLOYS, *CHANNELS, *GROUP III COMPOUNDS, *GROUP V COMPOUNDS, *JUNCTIONS, *QUANTUM ELECTRONICS, *SEMICONDUCTORS, *SILICON, *TRANSISTORS, *TUNNELING, ACCURACY, ALUMINUM, ANIONS, ANTIMONY, ARSENIC, CATIONS, EFFICIENCY, ENGINEERING, GALLIUM, HIGH RATE, INDIUM, INDUSTRIES, LIMITATIONS, MATERIALS, MOBILITY, OPTIMIZATION, PARAMETERS, PERFORMANCE(ENGINEERING), PHOSPHORUS, PRODUCTION, REGIONS, RELIABILITY, SELECTION, STRUCTURES, THEORY, TRANSPORT.

IDENTIFIERS: (U) PE81102F, WJAFOSR2306B1, LPN-SRI-8725.

AD-A200 337 20/14

TEXAS A AND M UNIV COLLEGE STATION

(U) Minimizing the Reflection of Waves by Surface Impedance Using Boundary Elements and Global Optimization.

DESCRIPTIVE NOTE: Journal article. 1 Sep 85-31 Aug 87,

JUN 88

PERSONAL AUTHORS: Chen, Goong; Bridges, Thomas J.; Zhou, Jianxin

CONTRACT NO. AFOSR-87-0334, \$AFOSR-88-0081

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-1108

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Wave Motion, v10 p239-255 1988. Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) This reprint considers the problem of minimizing the scattered field intensity with respect to the boundary impedance. Usual optimization procedures based on gradient type local minimization algorithms will not be effective for this problem because the scattered field intensity is not a convex function of the impedance, and it has many local extrema. The problem is approached here by first discretizing the Helmholtz partial differential equation using the boundary element method. Then some recently developed global optimization algorithms are applied to find approximate distributions of the boundary impedance for particular shapes which minimize the reflected field intensity. The boundary element method effects a reduction of dimensionality resulting in much greater computational efficiency. The global optimization algorithm allows us to pick out nearly global minimum solutions among many local minima. Numerical solutions are represented graphically and discussed. Our results show that a variable boundary impedance is much more effective for minimizing the

AD-A200 356

AD-A200 337

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 337 CONTINUED

AD-A200 336 12/3

scattered field than a constant boundary impedance. (jhd)

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

DESCRIPTORS: (U) *IMPEDANCE, *ELECTROMAGNETIC WAVE REFLECTIONS, *ELECTROMAGNETIC SCATTERING, ALGORITHMS, BOUNDARIES, COMPUTATIONS, CONVEX BODIES, DIFFERENTIAL EQUATIONS, DISTRIBUTION, EFFICIENCY, FIELD INTENSITY, FUNCTIONS, GLOBAL, GRADIENTS, NUMERICAL ANALYSIS, OPTIMIZATION, PARTIAL DIFFERENTIAL EQUATIONS, REPRINTS, SOLUTIONS(GENERAL), SURFACES, VARIABLES.

(U) Stochastic Evolution Equations Driven by Nuclear-Space-Valued Martingales.

88

PERSONAL AUTHORS: Kallianpur, G.; Perez-Abreu, V.

REPORT NO. TR-175

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0952

UNCLASSIFIED REPORT

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1, Helmholtz equation, Boundary element method.

SUPPLEMENTARY NOTE: Pub. in Applied Mathematics and Optimization, v17 p237-272 1988.

ABSTRACT: (U) This paper presents a theory of stochastic evolution equations for nuclear-space-valued processes and provides a unified treatment of several examples from the field of applications. (C sub 0,1) reversed evolution systems on countably Hilbertian nuclear spaces are also investigated. Keywords: Hilbert space; Reprints. (jhd)

DESCRIPTORS: (U) *HILBERT SPACE, *STOCHASTIC PROCESSES, EQUATIONS, EVOLUTION(GENERAL), FIELD CONDITIONS, REPRINTS, REVERSIBLE.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5, *Martingales.

UNCLASSIFIED

AD-A200 335 20/1 DELAWARE UNIV NEWARK DEPT OF MATHEMATICAL SCIENCES

AD-A200 335 20/1

DELAWARE UNIV NEWARK DEPT OF MATHEMATICAL SCIENCES

(U) The Inverse Scattering Problem for Time-Harmonic Acoustic Waves in an Inhomogeneous Medium,

88

PERSONAL AUTHORS: Colton, David; Monk, Peter

CONTRACT NO. AFOSR-88-0080

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-88-1055

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Quarterly Jnl. of Mechanics and Applied Mathematics, v41 pp 1 p88-125 1988.

ABSTRACT: (U) We consider the inverse scattering problem of determining the speed of sound in an inhomogeneous medium of compact support from a knowledge of the far-field patterns of the scattered fields corresponding to many incident time-harmonic plane waves. Based on the investigation of a new class of boundary-value problems for the reduced wave equation. We show that the far-field patterns are all clustered around a hyperplane in L^2 , where ω is the unit sphere. This result leads to two distinct optimization schemes for solving the inverse scattering problem. For the case of many incident plane waves, the second of these schemes is numerically more economical and using this scheme we provide numerical examples for the case of a spherically stratified medium. Reprints. (JMD)

DESCRIPTORS: (U) *ACOUSTIC WAVES, *HARMONICS, *PLANE WAVES, ACOUSTIC VELOCITY, BOUNDARY VALUE PROBLEMS, FAR FIELD, INVERSE SCATTERING, OPTIMIZATION, PATTERNS, REDUCTION, REPRINTS, SCATTERING, SPHERES, STRATIFICATION, TIME, WAVE EQUATIONS.

IDENTIFIERS: (U) PE811027, WJAFOSR2304A4.

AD-A200 335

AD-A200 333 4/2 21/4 13/1

COLORADO STATE UNIV FORT COLLINS ENGINEERING RESEARCH CENTER

(U) Urban Climate Effects of Energy Demand for Space Heating,

88

PERSONAL AUTHORS: Sheaffer, J.D.; Reiter, E.R.

CONTRACT NO. F49620-88-C-0080, DE-AS02-78EVO1340

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-88-1070

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Meteorology and Atmospheric Physics, v38 p202-214 1988.

ABSTRACT: (U) In the course of studying the weather dependence of fuel requirements for space heating in buildings, extensive and detailed heat source data were developed for several urban areas. These data were subsequently used for validating urban temperature fields which were derived from an advective-thermodynamic model of urban mixing heights. Results include analyses of urban climate data for assessing model performance under varying weather conditions and for validation of model assumptions. Empirical function for estimating stability and mixing heights in adjacent rural areas were also developed. Reprints. (MJM/AW)

DESCRIPTORS: (U) *ENERGY, *SPACE HEATERS, *URBAN AREAS, CLIMATE, FUELS, FUNCTIONS, HEAT, METEOROLOGICAL DATA, MODELS, REPRINTS, RURAL AREAS, SOURCES, TEMPERATURE.

AD-A200 333

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 332 21/2 12/1

AD-A200 331 7/3 7/4 21/9 21/4

CALIFORNIA UNIV DAVIS DEPT OF MECHANICAL ENGINEERING

CALIFORNIA UNIV BERKELEY

(U) Asymptotic Structure and Extinction of Diffusion
Flames with Chain Mechanism,(U) Fundamental Studies of Carbon, NH, and Oxygen Rings
and Other High Energy Density Molecular Systems.

88

DESCRIPTIVE NOTE: Final rept. 1 Apr 87-31 Mar 88.

PERSONAL AUTHORS: Birkan, W.A.; Law, C.K.

AUG 88

CONTRACT NO. AFOSR-85-0147

PERSONAL AUTHORS: Schaefer, Henry F., III

PROJECT NO. 2308

CONTRACT NO. AFOSR-87-0182

TASK NO. A2

PROJECT NO. 2303

MONITOR: AFOSR
TR-88-1087MONITOR: AFOSR
TR-88-1113

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Combustion and Flame, v73
p127-148 1988.

ABSTRACT: (U) The structure of a diffusion flame with a three-step chain mechanism, consisting of two high-energy thermal-neutral branching reactions and a zero-activation-energy termination reaction, has been studied using activation energy asymptotics via the model problems of counterflow and droplet flames. The analysis identifies three types of flames, depending on whether the rate of the termination reaction is fast, moderate, or slow as compared to the rates of the branching reactions. For the fast, moderate, or slow as compared to the rates of the branching reactions. For the fast recombination regime a unique extinction criterion has been derived which contains a chain extinction limit; the latter case is identified as Linan's extinction criterion. For the moderate and slow recombination regimes distinct extinction states do not exist. Reprints. (aw)

DESCRIPTORS: (U) *EXTINCTION, *FLAMES, *ASYMPTOTIC NORMALITY, ACTIVATION ENERGY, CHAINS, DIFFUSION, DROPS, FLOW, HIGH ENERGY, LIMITATIONS, MODELS, RECOMBINATION REACTIONS, REPRINTS, RESPONSE.

IDENTIFIERS: (U) PE81102F, WJAFOSR2308A2.

ABSTRACT: (U) The development of efficient and safe conventional (i.e., nonnuclear) propellants and/or fuels is a goal of obvious technological significance. A desirable quality of such a propellant is clearly a high ratio of energy release to mass. The present hypothesis rests on a simple, but previously unrecognized, analogy between oxygen and sulfur. Preliminary studies showed that the oxygen ring systems are sufficiently promising to warrant the detailed, high-level theoretical research reported here. Keywords: Quantum chemistry; Propellants; Oxygen compounds; Cyclic compounds. (kt)

DESCRIPTORS: (U) *FUELS, *PROPELLANTS, *QUANTUM CHEMISTRY, CARBON, CYCLIC COMPOUNDS, ENERGY TRANSFER, HYPOTHESES, OXYGEN, OXYGEN COMPOUNDS, OXYGEN EQUIPMENT, RATIOS, RINGS, SULFUR.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B3.

AD-A200 332

AD-A200 331

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 330 7/4

AD-A200 329 21/2 9/3

PRINCETON UNIV NJ DEPT OF CHEMISTRY

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) UVF Transport System for Laser Irradiation Studies.

(U) Digital Imaging of Laser-Ignited Combustion.

JUL 88

JUN 88

PERSONAL AUTHORS: Helms, A.L., Jr.; Schliedt, W.A.;
Bernasek, Steven L.; Biver, Bruce M.

PERSONAL AUTHORS: Seitzman, Jerry M.; Paul, Phillip H.;
Hanson, Ronald K.

CONTRACT NO. AFOSR-85-0208

CONTRACT NO. AFOSR-87-0057

PROJECT NO. 2303

PROJECT NO. 2308

TASK NO. A2

TASK NO. A3

MONITOR: AFOSR
TR-88-1022

MONITOR: AFOSR
TR-88-1148

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Review of Scientific
Instruments, v59 n7 p1223-1225 Jul 88.

SUPPLEMENTARY NOTE: Pub. in AIAA Thermophysics,
Plasmatdynamics and Lasers Conference, p1-5, 27-29 Jun 88,
AIAA-88-2775.

ABSTRACT: (U) The design of a UVF sample transfer system
is described. The transfer system allows irradiation of
samples under vacuum in a laboratory physically removed
from the location of the surface analysis system. Design
considerations and advantages of this design are
discussed. Keywords: Single crystal metals; Reprints.
(mjm)

ABSTRACT: (U) Ignition of combustible hydrocarbon and
air mixtures by ultraviolet lasers has been studied.
Single-point time-resolved emission spectra and two- and
three-dimensional laser-induced fluorescence images of
the hydroxyl radical, OH, have been recorded. Strong line
emission from carbon atoms and an anomalous enhancement
in the carbon emission, 150nsec after the ignition laser
pulse, suggest the possible importance of resonance
pumping of carbon atoms, possibly followed by
photoionization, as an energy deposition mechanism. The
three-dimensional distribution measurements show the
kernel to be cylindrically symmetric. The OH images also
show a preferential growth of the ignition kernel in the
direction of the incident laser. Reprints. (MJM/AW)

DESCRIPTORS: (U) *IRRADIATION, *LASER BEAMS, *METALS,
*SINGLE CRYSTALS, REPRINTS, SAMPLING, SURFACE ANALYSIS,
TRANSFER, TRANSPORT, VACUUM.

IDENTIFIERS: (U) PE61102F, WJAFOSR2303A2.

DESCRIPTORS: (U) *COMBUSTION, *HYDROCARBONS, *IGNITION,
*ULTRAVIOLET LASERS, AIR, ANOMALIES, ATOMS, CARBON,
DEPOSITION, DIGITAL SYSTEMS, EMISSION, EMISSION SPECTRA,
ENERGY, HYDROXYL RADICALS, IMAGES, LASER INDUCED
FLUORESCENCE, LASERS, LINE SPECTRA, MIXTURES,
OPTIMIZATION, PHOTOIONIZATION, PULSED LASERS, PUMPING,
REPRINTS, RESONANCE, SPATIAL DISTRIBUTION, THREE
DIMENSIONAL, TIME.

AD-A200 330

AD-A200 329

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 329 CONTINUED

AD-A200 312 4/1

IDENTIFIERS: (U) PE81102F, WJAFOSR2308A3.

HENRY KRUMB SCHOOL OF MINES NEW YORK

(U) Alfvén Waves in a Cold Plasma with Curved Magnetic Fields.

DESCRIPTIVE NOTE: Final rept. 1 Jan 85-31 Dec 86.

JUN 88

PERSONAL AUTHORS: Carrion, Phillip M.; Hasegawa, Akira; Patton, Waldo; Prakash, Manju

CONTRACT NO. AFOSR-85-0029

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-88-1083

UNCLASSIFIED REPORT

ABSTRACT: (U) The set of linearized magnetohydrodynamic equations has been reduced to the reflectivity equation for the compressional magnetic perturbations in the framework of the Radoski model. It has been shown that the reflection coefficient is a function of the inhomogeneities of the magnetic field, and the property of the reflectivity equation is that, near Alfvén resonant magnetic force lines, this equation reduces to the curvature free Budden equation. Near Alfvén resonances the curvature does not play a significant role and Budden's asymptotics in time can be applied to the wave field near the magnetic force lines where the Alfvén dispersion relation holds. Keywords: Magnetosphere; Resonance; Hydromagnetic waves. (jhd)

DESCRIPTORS: (U) *MAGNETOHYDRODYNAMIC WAVES, *MAGNETOSPHERE, CURVATURE, LINEAR ALGEBRAIC EQUATIONS, LOW TEMPERATURE, MAGNETIC DISTURBANCES, MAGNETIC FIELDS, MAGNETIC FORCES, MAGNETOHYDRODYNAMICS, PERTURBATIONS, PLASMAS(PHYSICS), REFLECTIVITY, MAGNETIC RESONANCE.

IDENTIFIERS: (U) PE81102F, WJAFOSR2311A1, Alfvén waves.

AD-A200 329

AD-A200 312

UNCLASSIFIED

PAGE 35 EVJ00F

UNCLASSIFIED

AD-A200 311 20/6.1 14/2 13/8 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 311 CONTINUED

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) Optical Fiber Science and Technology: Novel Fibers and Fiber Sensors.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-29 Feb 88,

FEB 88

PERSONAL AUTHORS: Morse, V. F.

CONTRACT NO. AFOSR-87-0020

PROJECT NO. 2917

TASK NO. A8

MONITOR: AFOSR
TR-88-1121

UNCLASSIFIED REPORT

ABSTRACT: (U) This equipment grant has permitted the purchase of a complete optical fiber draw facility and auxiliary equipment for our fiber characterization laboratory. The draw tower has been erected in a specially prepared laboratory. It is a 7.8 m automated tower with a 20 kw carbon induction furnace, and sufficient room for two uv coating stages, or a uv coating stage, and a thermal curing stage. The tower installation took perhaps somewhat more time than initially anticipated, largely due to difficulties in the site preparation. The tower itself has been installed on a reinforced concrete pad, with appropriate vibration isolation. For about six months, we have been gaining experience in the use of the tower, and have been drawing kilometer lengths of fiber that range in diameter from 50 microns to 250 microns with a tolerance of the order of a few microns. In anticipation of expanding the coating capabilities of our draw tower, a vacuum system was purchased for use with radio frequency sputtering on-line on the tower. This will be particularly useful for ceramic coated fibers in the study of the behavior of fiber strengthened composite materials. (jhd)

DESCRIPTORS: (U) *CERAMIC COATINGS, *FABRICATION, *FIBER OPTICS, CERAMIC FIBERS, COMPOSITE MATERIALS, CURING, DETECTORS, FIBER REINFORCED COMPOSITES, FIBERS.

AD-A200 311

AD-A200 311

UNCLASSIFIED

PAGE 36

EVJ00F

INSTALLATION, LENGTH, ON LINE SYSTEMS, OPTICS, PREPARATION, RADIOFREQUENCY POWER, SITES, SPUTTERING, STRENGTH(GENERAL), THERMAL PROPERTIES, TOLERANCE, TOWERS, ULTRAVIOLET RADIATION, VACUUM APPARATUS, VIBRATION ISOLATORS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2917A6, Draw tower.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 310 6/7 7/3

AD-A200 310 CONTINUED

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF
CHEMISTRY

PROPERTIES, TEMPERATURE, THEORY.

IDENTIFIERS: (U) PEB102F, WUAFOSR2303A3, *Polyacetylene.

(U) Development of Conducting Polymers of High Structural
Strength.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 85-31 May
88.

MAY 88

PERSONAL AUTHORS: Dalton, Larry R.

CONTRACT NO. F49620-85-C-0096

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-1043

UNCLASSIFIED REPORT

ABSTRACT: (U) Magnetic resonance measurements confirmed the fundamental pi-electron nature of the solitonic defect in polyacetylene. It is clear that the defect is delocalized with the exact extent and nature of delocalization dependent upon the lattice. For some polymer preparations, helium temperatures are required to freeze out dynamics and yield resolved ENDOR spectra. For these materials, the barriers to soliton delocalization must be small. Because of the dependence of ENDOR spectra upon polymer lattice, soliton concentration, temperature, it is clear that the intrinsic (isolated chain) soliton localization/delocalization length cannot be obtained from the experimental data. The ratio of positive to negative spin densities appears not to change with polymer lattice that these are likely determined by intramolecular electron coulomb interactions. Most theoretical calculations are in reasonable agreement with the experimental numbers. Polymers. (Wgm)

DESCRIPTORS: (U) *POLYMERS, *ACETYLENE, *ELECTRICAL CONDUCTIVITY, CHAINS, COMPUTATIONS, DENSITY, EXPERIMENTAL DATA, HELIUM, HIGH STRENGTH, ISOLATION, MAGNETIC RESONANCE, MEASUREMENT, NUMBERS, PREPARATION, RATIOS, SPINNING(MOTION), STRENGTH(MECHANICS), STRUCTURAL

AD-A200 310

AD-A200 310

UNCLASSIFIED

PAGE 37

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 283 8/10

AD-A200 293 CONTINUED

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Motion and Stability of Saturated Soil Systems Under Dynamic Loading.

DESCRIPTIVE NOTE: Geotechnical engineering rept. no. 31 (Final) 1 Feb 83-29 Feb 88.

FEB 88

PERSONAL AUTHORS: Sandu, Ramdir S.; Wolfe, William E.; Chohan, Harpal S.

REPORT NO. OSURF-717885-88-4

CONTRACT NO. AFOSR-83-008

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-88-0978

UNCLASSIFIED REPORT

ABSTRACT: (U) Theories of motion and stability of fluid-saturated soils, including the commonly used engineering approach to liquefaction analysis as well as theories based on mechanics of mixtures, are critically examined. Description of motion, development of equations of balance, constitutive relationships as well as development of solution procedures are reviewed. Limitations of various theories, their similarities as well as inconsistencies are identified. Laboratory investigations into dynamic behavior of saturated soils are reviewed. A theory of dynamics of saturated soils is described. It uses a convected coordinate system to describe the motion of soil particles, describing the motion of the fluid as relative to the solid. This theory is an extension of Gibson's theory of non linear soil consolidation to three dimensions and includes inertia effects. Solution procedures, developed for certain specializations of the equations of motion of saturated soils, include analytical, semi-analytical and numerical solution schemes. The finite element is selected as the numerical procedure for approximate solution. Spatial discretization, time domain solution procedures and

alternative formulations of field equations through a variational formulation are discussed. Shaking table tests for validation of theoretical concepts, performed on saturated Ottawa sand, included tests on anisotropically as well as isotropically consolidated samples and tests to study the effect of overburden on a soil system subjected to shaking. Harmonic as well as frequency banded random amplitude excitations were used. (EDC)

DESCRIPTORS: (U) *DYNAMIC LOADS, *SOIL DYNAMICS, *SHAKING, BALANCE, COORDINATES, DYNAMIC RESPONSE, EXCITATION, STABILITY, SOIL MECHANICS, ENGINEERING, EQUATIONS, FINITE ELEMENT ANALYSIS, FLUIDS, FORMULAS(MATHEMATICS), THREE DIMENSIONAL, VIBRATORS(MECHANICAL), INERTIA, LABORATORY TESTS, LIQUEFACTION, MOTION, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, PARTICLES, SAND, SATURATION, SOILS, SOLIDS, SOLUTIONS(GENERAL), TEST AND EVALUATION, THEORY, TIME DOMAIN, VALIDATION, VARIATIONAL PRINCIPLES, EQUATIONS OF MOTION, TWO PHASE FLOW.

IDENTIFIERS: (U) *Saturated soils, Constitutive properties, Ottawa sand, PE81102F, WUAFDSR2302C1.

AD-A200 293

AD-A200 293

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 292 20/6 9/3

AD-A200 292 CONTINUED

MARYLAND UNIV COLLEGE PARK INST FOR PHYSICAL SCIENCE AND TECHNOLOGY

(U) Intense XUV Radiation Sources.

DESCRIPTIVE NOTE: Final rept. 1 Apr 85-30 Sep 87.

SEP 87

CONTRACT NO. AFOSR-85-0174

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-88-0992

UNCLASSIFIED REPORT

ABSTRACT: (U) The results of the Nd:YAG laser (1.064 micron) experiments showed that the EUV output increased with laser pulse energy in a linear manner or slower. Therefore, there was no special incentive to go to higher pulse energies in the driver since increased problems of optical damage and of output saturation argued against moving in that direction. Because it was felt that higher repetition rates could translate directly into higher average outputs and published data indicated that the soft x-ray yield might be increased by use of shorter wavelengths in the laser driver, a 150 Hz excimer laser operating at 248 nm was purchased and installed as the driver for the laser plasmas. The peak pulse energy of this laser (Lambda Physik) with normal optics is 400 mJ/pulse energy of 320 mJ. Experiments with this system confirmed expectations and a reduction in exposure times for VUV and EUV emulsions of a factor of more than 20 when using the excimer rather than the Nd:YAG as a driver was observed. A major disadvantage in the use of a laser plasma light source has been the generation of large amounts of debris from the target, which coats optics and lithograph masks. A series of studies intended to minimize the amounts and effect of target debris, using the excimer laser driver were performed. Experience gained from these studies provided the basis for the new generation laser plasma light source chamber just completed in the laboratory. A paper is being prepared describing the new generation light source in detail. (rh)

AD-A200 292

AD-A200 292

DESCRIPTORS: (U) *DAMAGE, *LIGHT SOURCES, *PULSED LASERS, *YAG LASERS, DEBRIS, EMULSIONS, ENERGY, EXPOSURE (GENERAL), FAR ULTRAVIOLET RADIATION, HIGH RATE, INTENSITY, LASERS, MOTIVATION, OPTICAL PROPERTIES, OPTICS, OUTPUT, PEAK VALUES, PLASMAS (PHYSICS), PULSES, REPETITION RATE, SATURATION, SOFT X RAYS, SOURCES, TARGETS, YIELD, YTTRIUM ALUMINUM GARNET.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2301A1.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 290 19/9 14/2 8/10 AD-A200 290 CONTINUED

MARYLAND UNIV COLLEGE PARK DEPT OF CIVIL ENGINEERING

EXPLOSIVES, PETN, DEPTH, SHAPE, SIZES(DIMENSIONS), POSITION(LOCATION), EXTRAPOLATION, HIGH EXPLOSIVES, MODEL TESTS, MODELS, PARTICLE SIZE, PROTOTYPES, RADIUS(MEASURE), SAND, SCALE, SOIL MECHANICS, SOILS, STRENGTH(MECHANICS), VOLUME, WEIGHT.

(U) Geotechnical Centrifuge Modeling of Explosion Induced Craters - A Check for Scaling Effects.

DESCRIPTIVE NOTE: Final Rept. 1 Apr 88-31 Jul 88.

IDENTIFIERS: (U) Geotechnical centrifuges, Angularity, Half buried high explosives, PE8102F, WUAFOSR2302C1.

JUL 88

PERSONAL AUTHORS: Goodings, D. J.; Fournay, W. L.; Dick, R. D.

CONTRACT NO. AFOSR-88-0085

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-88-0988

UNCLASSIFIED REPORT

ABSTRACT: (U) One hundred twenty-one model tests of explosion induced craters in dry sand were conducted using small charges of PETN detonated at accelerations between 1g and 101g; ninety-six were found to be useful in analysis. Extrapolation to prototype dimensions indicates that for half-buried charges, crater volume, V, is a function of explosive weight, W to the 0.84 power, and crater radius and depth are functions of W to the 0.28 power. There were no detectable acceleration related scale effects from 31g to 101g. This confirms the value of the geotechnical centrifuge in modelling explosion induced craters at less than 100 g provided attention is paid to certain test conditions and scale effects. These include soil particle size, and angularity and soil strength which appear to strongly affect model crater volume and shape. Crater volume is also very sensitive to the unit weight of dry sand and to a lesser degree to charge location, geometry and orientation. Boundary effects arising from model dimensions and the centrifuge enclosure were examined. Keywords: Cratering, Model test extrapolation, Half buried high explosives. (EDC)

DESCRIPTORS: (U) *CRATERS, *EXPLOSION EFFECTS, *SCALING FACTORS, ACCELERATION, BOUNDARIES, BURIED OBJECTS, CENTRIFUGES, CRATERING, DRY MATERIALS, EXPLOSIVE CHARGES.

AD-A200 290

AD-A200 290

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 273 CONTINUED

SEEDING, SOLIDS, SUPPRESSION.

IDENTIFIERS: (U) PE81102F, WJAFOSR2308A2.

AD-A200 273 21/4 13/12

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Investigation of Fuel Additive Effects on Sooting
Flames.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 87-31 May
88.

JUN 88

PERSONAL AUTHORS: Bonczyk, Paul A.

REPORT NO. UTRC/R88-957464-A

CONTRACT NO. F49620-88-C-0054

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0801

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research is to clarify the mechanisms responsible for the suppression of soot in flames by fuel additives. Measurements are limited to well-defined hydrocarbon air prevaporized liquid- and gaseous-fueled flames. Gas-phase hydrocarbon species measurements have been made in an axisymmetric prevaporized iso-octane/air diffusion flame with and without ferrocene present as a fuel additive. The concentrations have been determined using quartz probe sampling and chromatographic analysis. Of the roughly twenty species detected, most were unaffected by the ferrocene. Expectations were C₂H₂ and H₂ which showed a decrease and increase, respectively, with ferrocene seeding. Solid effluent has been collected and analyzed by ESCA (Electron Scattering for Chemical Analysis) for the seeded flame. For seeding levels sufficient to suppress a soot plume, the effluent was hematite.
Keywords: Ferrocene; Flame; Soot; Fire prevention. (JES)

DESCRIPTORS: (U) *FIRE PREVENTION, *FLAMES, *FUEL ADDITIVES, *SOOT, AIR, CHEMICAL ANALYSIS, CHROMATOGRAPHIC ANALYSIS, EFFLUENTS, ELECTRON SCATTERING, FERROCENES, HEMATITE, HYDROCARBONS, PLUMES, PROBES, QUARTZ, SAMPLING.

AD-A200 273

AD-A200 273

UNCLASSIFIED

PAGE

41

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UNCLASSIFIED

AD-A200 269 20/4 AD-A200 259 9/1

SIBLEY SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING
ITHACA NY

(U) Unsteady Viscous Flows Over Moving Body.

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-30 Apr 88,

AUG 88

PERSONAL AUTHORS: Shen, S. F.

CONTRACT NO. AFOSR-88-0328

PROJECT NO. 2307

TASK NO. A3

MONITOR: AFOSR
TR-88-1032

UNCLASSIFIED REPORT

ABSTRACT: (U) Unsteady separation was computed using Lagrangian body fixed coordinates. The boundary layer equations retain the usual form except for a Coriolis term which is absent in the two dimensional body fixed coordinate case. Results of unsteady separation over a circular cylinder impulsively started are presented. Keywords: Unsteady aerodynamics; Unsteady separation. (Jhd)

DESCRIPTORS: (U) *UNSTEADY FLOW, *VISCOUS FLOW, AERODYNAMIC CHARACTERISTICS, BOUNDARY LAYER, CYLINDRICAL BODIES, COORDINATES, EQUATIONS, LAGRANGIAN FUNCTIONS, FLOW SEPARATION.

IDENTIFIERS: (U) PE81102F, WJAFOSR2307A3.

AD-A200 269

STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF PHYSICS
(U) Millimeter Wave Generation Using Josephson Junction Arrays.

DESCRIPTIVE NOTE: Final scientific rept. 1 May 85-30 Jun 88,

JUL 88

PERSONAL AUTHORS: Lukens, James E.

CONTRACT NO. AFOSR-85-0205

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR
TR-88-1052

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies have been carried out to develop methods to couple Josephson junction oscillators at frequencies near 100GHz so as to demonstrate the feasibility of Josephson effect sources of reasonable power and impedance. Phase-locking of junctions separated by greater than a wavelength and coupled through microstrip line has been demonstrated and found in accord with theory. Forty junction arrays operating at 100GHz and 350GHz using this phase-locking scheme have been tested. Both series and parallel biasing of the junctions have been tested. It has been established that a total critical current spread of less than 10% is required for complete phase-locking with series bias. For parallel biased arrays with a critical current spread of 20%, all junctions locked in-phase providing coherent addition of power to the 20 Ohm load. (rh)

DESCRIPTORS: (U) *ARRAYS, *JOSEPHSON JUNCTIONS, *MILLIMETER WAVES, *STRIP TRANSMISSION LINES, ADDITION, BIAS, COHERENCE, JUNCTIONS, PARALLEL ORIENTATION, SOURCES, WAVE PROPAGATION.

IDENTIFIERS: (U) PE81102F, WJAFOSR2305C3.

AD-A200 259

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 258 20/9

COAL TECH CORP MERION PA

(U) High Pulsed Power, Self Excited Magnetohydrodynamic Power Generation Systems.

DESCRIPTIVE NOTE: Final rept. 1 Nov 84-31 Oct 85,

DEC 85

PERSONAL AUTHORS: Zauderer, B.; Fleming, E.; Wang, J.

REPORT NO. CT-85-10

CONTRACT NO. F49620-85-C-0025

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-88-1002

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this study was to examine the feasibility of achieving high power, high energy, repetitive pulses over a multi-second period, using a portable, self-excited, magnetohydrodynamic (MHD) generator system. To assure a compact, portable system, a room temperature MHD magnet, and operation without a supersonic diffuser was assumed. The approach selected was to use a cv, self-excited, MHD generator to provide the power for the magnetic field in a shaped explosive, argon plasma, MHD generator. The latter's output power pulses are converted in a pulse shaping network to the ultimate load. For the cv generator, a novel system consisting of a non-equilibrium MHD generator, with a noble gas working fluid, and heated directly with a high energy chemical fluid, was used. A novel, compact room temperature magnet was used with the cv MHD generator. This generator's system power output per unit volume and per unit total system weight is much higher than the values obtainable in high energy liquid or solid rocket fuel driven, combustion MHD generators. Among the barrier problems to the use of the shaped explosive, argon plasma MHD generator is survival of all the components for more than one pulse. It was found that the use of the novel cv MHD generator system directly with a pulsed forming

AD-A200 258

UNCLASSIFIED

AD-A200 258

PAGE 43

EVJ00F

AD-A200 258 CONTINUED

network, and completely eliminating the explosive generator, resulted in a superior system performance compared to the best levels projected with advanced explosive and combustion MHD generators. Keywords: Explosive magneeto hydrodynamics, Metal fuel combustion. (JHD)

DESCRIPTORS: (U) *FUELS, *ELECTRIC GENERATORS, *MAGNETOHYDRODYNAMIC GENERATORS, *METALS, ARGON, BARRIERS, COMBUSTION, EXPLOSIVES, FLUIDS, HIGH ENERGY, HIGH POWER, LIQUIDS, MAGNETIC FIELDS, MAGNETOHYDRODYNAMICS, MAGNETS, NETWORKS, NONEQUILIBRIUM FLOW, OUTPUT, PLASMA GENERATORS, PLASMAS(PHYSICS), POWER, PULSES, RARE GASES, ROOM TEMPERATURE, SHAPE, SUPERSONIC DIFFUSERS, WEIGHT.

IDENTIFIERS: (U) PE81102F, WUAFOSR2301A7.

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 254 11/2

AD-A200 253 12/5

WEST VIRGINIA UNIV MORGANTOWN DEPT OF PHYSICS

COLUMBIA UNIV NEW YORK

(U) High Temperature Properties of Ceramic/Carbon Systems in an Oxidizing Environment.

(U) Massive Symbolic Mathematical Computations and Their Applications.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 87-31 May 88.

DESCRIPTIVE NOTE: Quarterly rept. 1 May-31 Jul 88.

MAY 88

AUG 88

PERSONAL AUTHORS: Cooper, Bernard R.; Montano, Pedro A.

PERSONAL AUTHORS: Chudnovsky, David V.; Chudnovsky, Gregory V.; Friedman, Morton B.; Prendergast, K.

CONTRACT NO. AFOSR-87-0251

REPORT NO. TR-2

PROJECT NO. 2306

CONTRACT NO. F4820-87-C-0113

TASK NO. A2

PROJECT NO. 2304

MONITOR: AFOSR
TR-88-1078

TASK NO. A4

MONITOR: AFOSR
TR-88-1112

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of our research is to identify and learn to constructively modify the features of the bonding interactions that lead to brittleness in carbon-based ceramic materials. We have been examining the titanium/carbon and tungsten/carbon systems, both the naturally occurring carbides and artificially constructed superlattices. We are examining the question of whether artificially constructed multilayer (superlattices) structures offer an advantage over the naturally occurring crystalline structures in maintaining high temperature mechanical stability in an oxygen-containing environment. This related to the modification of the type of bonding, metallic versus covalent, possible by making artificial structures and how this affects brittleness and hence fracture behavior. (JES)

DESCRIPTORS: (U) *BONDING, BRITTLENESS, CARBON.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2, *CERAMIC CARBON SYSTEMS.

UNCLASSIFIED REPORT

ABSTRACT: (U) The development is continued on codes solving large-scale realistic models of aero-, hydrodynamic and astrophysical problems on fast vector and parallel versions of three-dimensional of aero- and hydrodynamics codes, tested by us on a variety of two-dimensional problems. These codes are used now for solutions of astronomical, astrophysical and cosmological problems. The main part of the code development is the reduction of its computational complexity, to make it feasible to run in a moderate time (days of supercomputers) large simulations of galaxy evolution over a large fraction of Hubble time. For this purpose we use symbolic computational methods and computer algebra programs and tools, developed by us. Particularly successful was the development of specialized fast (scalar, vector and parallel) subroutines of evaluation of special functions and their integrals in the astrophysical code (needed for computation of chemical, thermodynamical and gravitational effects), that consume most of the runtime of the programs. Our algorithms for special function evaluations are based on our fast methods of power series and rational approximation computations. Keywords: Parallel processing; Symbolic

AD-A200 254

AD-A200 253

UNCLASSIFIED

PAGE 44

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 253 CONTINUED

AD-A200 247 21/4 20/4

programming. (jhd)

NIELSEN ENGINEERING AND RESEARCH INC MOUNTAIN VIEW CA

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *PARALLEL PROCESSING, *SYMBOLIC PROGRAMMING, ALGEBRA, ALGORITHMS, ASTROPHYSICS, CODING, COMPUTATIONS, COSMOLOGY, EVOLUTION(GENERAL), GALAXIES, GRAVITY, HYDRODYNAMIC CODES, HYDRODYNAMICS, INTEGRALS, MATHEMATICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, POWER SERIES, SIMULATION, SPECIAL FUNCTIONS(MATHEMATICAL), SUBROUTINES, TWO DIMENSIONAL.

(U) Spray Formation: Three-Dimensional Liquid Break-Up due to Surface Tension.

DESCRIPTIVE NOTE: Final rept. Apr 88-Mar 88.

AUG 88

PERSONAL AUTHORS: Childs, Robert E.

IDENTIFIERS: (U) PE61102F, WUAF05K2304A4.

REPORT NO. NEAR-TR-389

CONTRACT NO. F49820-86-C-0062

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-1063

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the AIAA Aerospace Sciences Meeting (26th) Held in Reno, Nevada.

ABSTRACT: (U) The growth instabilities on the interface between a liquid jet and its gaseous environment is an important mechanism in spray atomization, and it is the subject of the work reported herein. Numerical simulations based on the Navier-Stokes equations were used to model liquid/gas interface flows. An algorithm was developed for solving the unsteady Navier-Stokes equations for incompressible fluid with a discontinuity in density and with surface tensions and its accuracy was demonstrated. In flows representative of round pressure-atomized jets and pressure-swirl atomizers, nonuniform mean velocity distributions resulting from viscous boundary layers were found to have a significant effect on instability growth. In a round jet, the inclusion of a boundary layer-like velocity profile significantly reduced the growth rate of small wavelength instabilities. The velocity profile had a much greater effect than surface tension on the initial atomization process for the flow parameters considered. A good estimate of initial fuel droplet size was obtained by considering boundary layer effects but disregarding surface tension.

AD-A200 253

AD-A200 247

UNCLASSIFIED

PAGE 45

EVJ00F

UNCLASSIFIED

ERIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 247 CONTINUED

AD-A200 248 8/4 8/15

In a flow representative of the fuel issuing from a pressure-swirl nozzle, nonuniformity of the velocity profile was found to increase the growth rate of a disturbance mode which is directly responsible for spray breakup. Keywords: Fuel sprays, Computational fluid dynamics. (MWM/AW)

DESCRIPTORS: (U) *FLUID DYNAMICS, *FUEL SPRAYS, *VISCOUS FLOW, ACCURACY, ALGORITHMS, ATOMIZATION, BOUNDARY LAYER, COMPUTATIONS, DISTRIBUTION, DROPS, ENVIRONMENTS, FLOW, FLUIDS, FUELS, GASES, GROWTH(GENERAL), INCOMPRESSIBILITY, INTERFACIAL TENSION, LIQUID JET'S, MEAN, NAVIER STOKES EQUATIONS, NONUNIFORM, NUMERICAL ANALYSIS, PARAMETERS, PROFILES, RATES, SIZES(DIMENSIONS), SPRAYS, STABILITY, SURFACES, TENSION, VELOCITY.

IDENTIFIERS: (U) PE61102F WUAFOSR2308A2.

HARVARD MEDICAL SCHOOL BOSTON MA DEPT OF PHYSIOLOGY AND BIOPHYSICS

(U) Pharmacological Resetting of the Circadian Sleep-Wake Cycle.

DESCRIPTIVE NOTE: Final rept. 1 May 88-30 Apr 88.

JUN 88

PERSONAL AUTHORS: Moore-Ede, M.C.

CONTRACT NO. AFOSR-86-0187

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-1045

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-A186 194.

ABSTRACT: (U) Our research has seen the completion of several projects aimed at elucidating the chronopharmacological properties of benzodiazepines in rodents and monkeys, and at investigating the circadian and homeostatic mechanisms involved in the regulation of sleep in monkeys. We have also recently completed a series of studies on the neural control of circadian rhythms in the squirrel monkey. The results obtained thus far have several interesting implications, some of which are currently being tested. Keywords: Circadian rhythms; Circadian pacemaker; Suprachiasmatic nuclei; Triazolam; Diazepam; Rapid eye movement; Phase response curve; Phase shift; Reentrainment; Sleep deprivation; Homeostasis. (AW)

DESCRIPTORS: (U) *CIRCADIAN RHYTHMS, *DIAZEPAM, *HYPNOTICS AND SEDATIVES, CONTROL, EYE MOVEMENTS, GRAPHS, HOMEOSTASIS, MONKEYS, NERVES, NUCLEI, PHASE SHIFT, RESPONSE(BIOLOGY), RODENTS, SLEEP, SLEEP DEPRIVATION, SQUIRREL MONKEYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2, *Sleep wake cycles, Benzodiazepines, Triazolam.

AD-A200 247

AD-A200 248

UNCLASSIFIED

PAGE 46

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 235

11/2

AD-A200 234 13/5 20/11

ARIZONA UNIV TUCSON DEPT OF CIVIL ENGINEERING

ARIZONA UNIV TUCSON DEPT OF CIVIL ENGINEERING

(U) Constitutive Modelling of Joints under Cyclic Loading.
Part 4. Development of Simulated Rock Like Material
and Testing.

(U) Constitutive Modelling of Joints under Cyclic Loading.
Part 3. Cyclic Multi Degree-of-Freedom Shear Device
with Pore Water Pressure.

DESCRIPTIVE NOTE: Final rept.

DESCRIPTIVE NOTE: Final rept.

JUL 88

JUL 88

CONTRACT NO. AFOSR-83-0250

CONTRACT NO. AFOSR-83-0250

MONITOR: AFOSR
TR-88-1029-PT-4MONITOR: AFOSR
TR-88-1029

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 1, AD-A200 232.

SUPPLEMENTARY NOTE: See also Part 4, AD-A200 235.

ABSTRACT: (U) This part contains brief description of development and testing of simulated rock type material that can be used in place of concrete. The need for this research was identified at later stages of this research project (AFOSR-830250) because the accuracy of measurements of deformation for concrete was limited due to its high stiffness, and damage due to cycles of loading was not significant. It is planned to use this material for future testing for rocks and rock joints. This report, which constitutes a paper in the ASME Energy Technology Conference, Houston, Texas, 1989, also contains a study of the effect of specimen height on damage and softening in the material with respect to the hierarchical damage model proposed and developed during the project. (mjm)

DESCRIPTORS: (U) *CONCRETE, *MATERIALS, *ROCK, *SIMULATION, ACCURACY, CYCLES, DAMAGE, DEFORMATION, ENERGY, HEIGHT, HIERARCHIES, JOINTS, LOADS(FORCES), MODELS, STIFFNESS, SYMPOSIA, TEXAS.

ABSTRACT: (U) The previous device described in Part 1 of this Final Report allowed testing of joints and interfaces under dry conditions. This device needed certain modifications such as inclusion of pore water pressure, need to reduce or avoid moment effects due to the eccentricity of the normal and shear loads, need to increase the loading capacity, and need to install devices to measure pore water pressures at the joints and additional devices to measure displacements and stresses. Thus a new loading frame and circular test device were designed and fabricated. This brief report describes details of the frame, test device and electronic control and data acquisition system. The newly developed dynamic direct-shear device is designed to hold an 7.5-inch diameter 3-inch thick upper sample and a 9-inch diameter 3-inch thick lower sample. As the lower sample is larger than the upper sample, the interface area always remains constant during the test. A normal stress of 400 psi (2.7 MPa) and a shear stress of 550 psi (3.9 MPa) can be applied and developed at the interface. Both of these stresses may be increased by modification of the device. The horizontal actuator attaches right at the level of the interface so no significant moment is induced at the interface by the push or pull of the top box. Keywords: Computers, Control systems, Hydraulic systems, Friction, Test equipment. (AW)

DESCRIPTORS: (U) *JOINTS, *CYCLIC TESTS, ACTUATORS, BOXES, CAPACITY(QUANTITY), CIRCULAR, COMPUTERS, CONTROL,

AD-A200 235

AD-A200 234

UNCLASSIFIED

PAGE 27

EVJ00F

UNCLASSIFIED

AD-A200 234 CONTINUED
CYCIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 234 CONTINUED

AD-A200 233 20/11 12/4

CONTROL SYSTEMS, CYCLES, DATA ACQUISITION, DEGREES OF FREEDOM, DISPLACEMENT, ECCENTRICITY, ELECTRONIC EQUIPMENT, FRAMES, FRICTION, HORIZONTAL ORIENTATION, HYDRAULIC EQUIPMENT, INTERFACES, LOADS(FORCES), MOMENTS, PORE PRESSURE, PRESSURE MEASUREMENT, SHEAR PROPERTIES, SHEAR STRESSES, STRESSES, TEST EQUIPMENT, WATER.

ARIZONA UNIV TUCSON DEPT OF CIVIL ENGINEERING

(U) Constitutive Modelling of Joints under Cyclic Loading.
Part 2. Further Development of Hierarchical Plasticity Model for Joints.

DESCRIPTIVE NOTE: Final rept.

JUL 88

CONTRACT NO. AFOSR-83-0256

MONITOR: AFOSR
TR-88-1029-PT-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 3, AD-A200 234.

ABSTRACT: (U) Discontinuities or joints play a significant role in the behavior of structures founded on discontinuous rocks (or soils) which contribute an important source of weakness. Although modern computational techniques make numerical analysis possible, proper constitutive relations for discontinuities must be used in order to obtain reliable and useful results. Discontinuity, by definition, is the boundary region between two materials. Usually it is weaker compared to surrounding intact materials. The geometry and roughness of the joint walls play a significant role in the shear strength and deformation of the joint. The opposite walls of the discontinuity have only finite contacts, air, liquid and filling materials are often present, and it possesses negligible strength in tension. As a consequence, its behavior is quite different from that of continua surrounding it. This model represents a generalized and modified development of the model presented in Part A of this report. The proposed generalized model allows for detailed consideration of the normal and shear components of the joint response, and is verified for both normal stress and normal stiffness controlled conditions. (mjm)

DESCRIPTORS: (U) *DISCONTINUITIES, *MATERIALS, *PLASTIC PROPERTIES, *SOILS, *ROCK, *BOUNDARY LAYER, BEHAVIOR, BOUNDARIES, COMPUTATIONS, CONTROL, CYCLES, DEFORMATION, FILLING, HIERARCHIES, LOADS(FORCES), MODELS, NUMERICAL ANALYSIS, REGIONS, RESPONSE, ROUGHNESS, SHEAR PROPERTIES,

AD-A200 234

AD-A200 233

UNCLASSIFIED

PAGE 48

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 233 CONTINUED

AD-A200 232 8/7 8/10 13/2

SHEAR STRENGTH, STIFFNESS, STRESSES, STRUCTURES, WALLS.

ARIZONA UNIV TUCSON DEPT OF CIVIL ENGINEERING

- (U) Constitutive Modelling of Joints under Cyclic Loading.
Part 1. Modelling and Testing of Idealized Rock Joints.

DESCRIPTIVE NOTE: Final rept. Aug 83-Jul 88,

JUL 88

PERSONAL AUTHORS: Desai, C. S.; Fishman, K. L.; Ma, Y.;
Rigdy, D.; Kundu, T.

CONTRACT NO. AFOSR-83-0258

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-88-1028-PT-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 2, AD-A200 233.

ABSTRACT: (U) A rather novel plasticity based constitutive model to describe the response of simulated (rock) joints under cyclic, quasi-static and static shear is developed. Development of the constitutive model includes both mathematical formalization based on the hierarchical approach and laboratory testing. The mathematical formulation is basic and general and is capable of predicting observed behavior of joints. Laboratory test results are used to determine parameters for the model and to compare with model predictions. The constitutive model is based on the theory of incremental plasticity. A generalized three-dimensional plasticity model capable of predicting the behavior of geologic solid material such as soil and rock is specialized to describe the behavior of individual rock joints. The model allows for effects of initial normal stress, states of shear and normal stress, plastic hardening, nonassociativeness, volume changes at joints, and cycles of loading, unloading and reverse loading. The test program was conducted on simulated joints. The simulated specimens were cast in concrete with a variety of surface geometries (angles of asperities). Specimens were subjected to a series of quasistatic and fast cyclic

AD-A200 233

AD-A200 232

UNCLASSIFIED

PAGE 48 EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 232 CONTINUED

AD-A200 228 7/6

direct shear tests. Keywords: Shear loading; Reverse loading; Unloading; Engineering geology; Rock mechanics; Soil mechanics; Cyclic loading; Rock joints; Dynamic loads. (eoc)

DESCRIPTORS: (U) *DYNAMIC LOADS. *JOINTS. *ROCK MECHANICS. *SOIL MECHANICS. CONCRETE. CYCLES. ENGINEERING GEOLOGY. FORMULAS(MATHEMATICS). HARDENING. HIERARCHIES. LABORATORY TESTS. LOADS(FORCES). MODEL TESTS. PLASTIC PROPERTIES. MATHEMATICAL MODELS. MATHEMATICAL PREDICTION. REVERSIBLE. ROCK. SHEAR PROPERTIES. SIMULATION. SOILS. SOLIDS. STATICS. STRESSES. SURFACES. THREE DIMENSIONAL. UNLOADING. VOLUME.

IDENTIFIERS: (U) Cyclic loads. Constitutive models. *Rock joints. Reverse loading. Asperities. PE81102F. WJAF0SR2302C1.

NORTHWESTERN UNIV EVANSTON IL

(U) PBT,PBO-Based Hybrid Polymers with Nonlinear Optical Properties or High Electrical Conductivity.

DESCRIPTIVE NOTE: Final rept. 15 Mar 88-15 Aug 88.

AUG 88

PERSONAL AUTHORS: Marks, Tobin J.; Carr, Stephen H.

CONTRACT NO. AFOSR-88-0105

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-1023

UNCLASSIFIED REPORT

ABSTRACT: (U) This project involves a collaborative synthetic, polymer processing, and physicochemical program directed at exploiting the unique properties of the high modulus/high strength polymers poly(p-phenylenebenzobisthiazole) (PBT) and poly(p-phenylenebenzobisoxazole) (PBO) for electronic charge transport and nonlinear optical (NLO) properties. In the former area, we have continued our successful studies of directly doping these polymers by electrochemical means and of processing phthalocyanine/polymer hybrid materials. In the NLO area, we have continued exploration of the properties of NLO chromophore/PBT hybrid materials and of glassy macromolecules with such chromophores covalently bonded to the backbone. Initial studies of oriented NLO chromophores embedded in crosslinkable matrices have also been carried out. Approaches to inorganic/organic hybrid NLO materials via intercalation processes are also under investigation. Keywords: Conductive polymers, Phthalocyanine, Nonlinear Optical properties, Polymer doping.

DESCRIPTORS: (U) *ELECTRICAL CONDUCTIVITY. *HYBRID SYSTEMS. *PHthalOCYANINES. *POLYMERS. BONDED JOINTS. CHARGE TRANSFER. CHROMOPHORES. CONDUCTIVITY. DOPING. ELECTRON TRANSPORT. GLASS. HIGH RATE. INORGANIC MATERIALS. MACROMOLECULES. MATERIALS. NONLINEAR SYSTEMS. OPTICAL

AD-A200 232

AD-A200 228

UNCLASSIFIED

PAGE 50

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 226

CONTINUED

PROPERTIES, PHYSICO-CHEMICAL PROPERTIES, PROCESSING.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, *Thiazole/
phenylenebenzobis, *Oxazole/phenylenebenzobis.

AD-A200 225

7/2

7/4

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Collisional Energy Pooling for Sr(5 3PJ) + Sr(5 3PJ')
Yields Sr(6 (3,1)S) + Sr(5 1S).

AUG 88

PERSONAL AUTHORS: Kelly, J. F.; Harris, M.; Gallagher, A.

CONTRACT NO. AFOSR-84-0272, NSF-PHY86-04504

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-1033

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v38 n3
p1225-1229, 1 Aug 88.

ABSTRACT: (U) Energy pooling (EP) has been observed in Sr vapor following pulsed optical excitation to the 53P1 state. From the time-dependent radiative decay of 63S1 and of 61S0 via the cascade resonance line, the EP rate coefficients have been investigated for the following: Sr(53PJ)+Sr(53PJ')(kJJ') Sr(51S0)+Sr(63S1 or 61S0). The values of k11 have been measured, as well as kJ1, averaged over a thermal distribution of 53PJ populations. The time-dependent Sr(53PJ) densities were measured by absorption of lines from a Sr lamp crossing the excitation region. The rate coefficients are surprisingly large; in spite of the small statistical weights of these product states, they are nearly gas-kinetic. The dependence of the rates upon spin, J, and energy defect delta has also been examined. Keywords: Energy pooling, Energy transfer, Strontium compounds, Reprints. (MUM)

DESCRIPTORS: (U) *ENERGY TRANSFER, *STRONTIUM COMPOUNDS, ABSORPTION SPECTRA, COEFFICIENTS, COLLISIONS, DISTRIBUTION, ENERGY, EXCITATION, LINE SPECTRA, RADIOACTIVE DECAY, RATES, REGIONS, REPRINTS, RESONANCE, STATISTICS, THERMAL PROPERTIES, TIME DEPENDENCE, WEIGHT.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B1.

AD-A200 226

AD-A200 225

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 223 20/14 20/15

AD-A200 222 20/4 1/1

DELAWARE UNIV NEWARK DEPT OF MATHEMATICAL SCIENCES

COLORADO UNIV AT BOULDER

(U) Far Field Patterns and the Inverse Scattering Problem for Electromagnetic Waves in an Inhomogeneous Medium,

(U) Unsteady Separated Flows: Structures and Processes.

DESCRIPTIVE NOTE: Final rept. Jun 84-Jul 88.

88

AUG 88

PERSONAL AUTHORS: Colton, David; Palvarinta, Lassi

PERSONAL AUTHORS: Luttges, W.; Freymuth, P.; Chow, C. Y.

CONTRACT NO. AFOSR-88-0087

CONTRACT NO. F49620-84-C-0085

PROJECT NO. 2304

PROJECT NO. 2307

TASK NO. A4

TASK NO. A3

MONITOR: AFOSR

TR-88-1132

MONITOR: AFOSR

TR-88-0987

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Mathematical Proceedings. Cambridge Philosophical Society, v103 p561-575 1988.

ABSTRACT: (U) We consider the scattering of time harmonic electromagnetic waves by an inhomogeneous medium of compact support. It is first shown that the set of far field patterns of the electric fields corresponding to incident planes waves propagating in arbitrary directions is complete in the space of square integrable tangential vector fields defined on the unit sphere. We then show that under certain conditions the electric far field patterns satisfy an integral identity involving the unique solution of a new class of boundary value problems of Maxwell's equations called the interior transmission problem for electromagnetic waves. Finally, it is indicated how this integral identity can be used to formulate an optimization scheme yielding an optimal solution of the inverse scattering problem for electromagnetic waves. Keywords: Reprints. (MUM)

DESCRIPTORS: (U) *ELECTRIC FIELDS, *ELECTROMAGNETIC RADIATION, *FAR FIELD, *INVERSE SCATTERING, BOUNDARY VALUE PROBLEMS, HARMONICS, INTERNAL, MAXWELLS EQUATIONS, OPTIMIZATION, PATTERNS, REPRINTS, SCATTERING, SOLUTIONS(GENERAL), SPHERES, TANGENTS, TIME, TRANSMITTANCE, VECTOR ANALYSIS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A4.

AD-A200 223

DESCRIPTORS: (U) *FLOW SEPARATION, *UNSTEADY FLOW, AIRFOILS, BOUNDARY LAYER FLOW, BOUNDARY LAYER TRIPS, COMPUTATIONS, AERODYNAMICS, FLIGHT, OSCILLATION, STALLING, FUNCTIONS(MATHEMATICS), THEORY, VISCOUS FLOW, VORTICES.

IDENTIFIERS: (U) Dynamic stall, Forcing functions, PE81102F, WUAFOSR2307A3.

AD-A200 222

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 221 7/4

AD-A200 221 CONTINUED

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL
LABS

FLUIDS, MODELS, MOLECULES, MOTION, PARALLEL ORIENTATION,
REVERSIBLE, SHOCK WAVES, TEST AND EVALUATION, THERMAL
CONDUCTIVITY, VELOCITY.

(U) Investigations of the Motion of Discrete-Velocity
Gases by Cellular Automata.

IDENTIFIERS: (U) PE81102F, WUAFOSR2307A1.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan-31 Dec 87,

SEP 88

PERSONAL AUTHORS: Sturtevant, Bradford; Broadwell, James
E.

CONTRACT NO. AFOSR-87-0155

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-88-0934

UNCLASSIFIED REPORT

ABSTRACT: (U) A model of molecular gasdynamics with discrete components of molecular velocity has been implemented for parallel computation, and two test problems have been calculated. It is shown that fewer than ten values of each component of molecular velocity are necessary to produce accurate results in calculations by direct-simulation Monte-Carlo methods of rarefied-gas flows involving moderately strong shock waves. Thus significant savings in memory required to store the molecular velocities are realized. Most cellular automata intended to describe fluid motion simulate single-speed particles moving on square or hexagonal lattices. It is clear that with only one allowed molecular speed, temperature or energy cannot be specified independently of the velocity. The present paper describes the results of an exploratory investigation of heat conduction and shock wave formation with the two-dimensional model. The irreversible macroscopic behavior of this microscopically reversible system is also examined. Keywords: Molecular gasdynamics; Direct simulation; Monte Carlo method; Cellular automata. (mgm)

DESCRIPTORS: (U) *AUTOMATA, *GAS DYNAMICS, *MONTE CARLO METHOD, *SIMULATION, ACCURACY, CELLS, COMPUTATIONS.

AD-A200 221

AD-A200 221

UNCLASSIFIED

PAGE

53

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 219

7/5

AD-A200 219 CONTINUED

BERKELEY RESEARCH ASSOCIATES INC SPRINGFIELD VA

(U) Modeling of Atomic Processes for X-Ray Laser Plasmas.

DESCRIPTIVE NOTE: Final rept. 15 Jun 86-14 Feb 88,

JUL 88

*PLASMAS(PHYSICS), *RECOMBINATION REACTIONS, ATOMIC PROPERTIES, COEFFICIENTS, COLLISIONS, COMPUTATIONS, DENSITY, DISTORTION, ELECTRON IMPACT SPECTRA, ELECTRICAL LASERS, ELECTRONS, EXCHANGE REACTIONS, EXCITATION, HARD X RAYS, IMPACT, INVERSION, IONIZATION, IONS, LASERS, MODELS, POPULATION, RADIATION, RADIOACTIVE DECAY, RATES, SOFT X RAYS, THEORY, WAVES, EXCITATION.

PERSONAL AUTHORS: Gupta, Uday

IDENTIFIERS: (U) PE61102F, WUAF0SR2301A8, X ray lasers.

REPORT NO. BRA-88-W010R

CONTRACT NO. F49620-86-C-0078

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-88-0977

UNCLASSIFIED REPORT

ABSTRACT: (U) This work dealt with the theoretical modeling and computation of photoionization, photoexcitation, radiative decay and radiative recombination processes for multielectron atoms and ions in plasmas. Such atomic processes lead to and influence lasing in x-ray lasers operating both in the soft and hard x ray regions. This research utilized a two-component, finite temperature, self consistent density functional method and demonstrated that this method is applicable for arbitrary plasma density and temperature and is capable of accurately treating multielectron ions of arbitrary Z. Electron collisional ionization and excitation processes were investigated. These processes are an important mechanism through which population inversion of ionic energy levels lead to lasing in the soft x-ray region. Previously theoretical calculations utilizing a semi-classical impact approximation have been performed. In many cases such a method is inadequate. Computations were carried out by electron impact ionization and excitation cross-sections and rate coefficients utilizing the distorted wave with exchange method. Keywords: Photoionization, Photoexcitation, Plasmas, Multielectron, Atoms. (JHD)

DESCRIPTORS: (U) *PUMPING(ELECTRONICS), *PHOTOIONIZATION,

AD-A200 219

AD-A200 219

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 218 7/3 AD-A200 218 CONTINUED

BRISTOL UNIV (ENGLAND) DEPT OF INORGANIC CHEMISTRY

(AW)

(U) Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 74. Salts of the Anions (W(Triple Bond CR)(CO)₂ (Eta(5)-C₂B₉H₉Me₂))- (R-C₆H₄Me-2 or C₆H₃Me₂-2,6) as Reagents for the Synthesis of Compounds with Heteronuclear Metal-Metal Bonds: Crystal Structure of (N(Et)₄)- (FeW(mu)-CC₆H₃Me₂-2,6)(CO)₅(Eta(5)-C₂B₉H₉Me₂)).

DESCRIPTORS: (U) *METAL COMPLEXES, *SALTS, *ORGANOMETALLIC COMPOUNDS, ANIONS, ATOMS, BENZENE, CHEMICAL BONDS, CARBENES, CHEMISTRY, CRYSTAL STRUCTURE, LIGANDS, METALS, MODIFICATION, PATTERNS, REACTIVITIES, REPRINTS, RINGS, SYNTHESIS(CHEMISTRY), TUNGSTEN.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B2.

88

PERSONAL AUTHORS: Baumann, Franz-Erich; Howard, Judith A.; Musgrove, Rupert J.; Sherwood, Paul; Stone, F. G.

CONTRACT NO. AFOSR-84-0125

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-88-1037

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Dalton Transactions p1875-1885 1988. See also Part 75, AD-A200 085.

ABSTRACT: (U) In a series of papers we have described how the salts X-W (triple bond CC₆H₄Me-4)(CO)₂(eta(5)-C₂B₉H₉Me₂) (X = N(PPh₃)₂ (1a), PPh₄ (1b), or P(CH₂Ph) Ph₃ (1c)) may be used as reagents for preparing complexes in which heteronuclear metal-metal bonds are bridged by the p-tolylmethylidene group. Moreover, in some syntheses a non-spectator role for the carbaborane ligand has been identified. The most common modification of the carbaborane group involves some slippage away from the tungsten so as to form an exopolyhedral B-H yields M bond with the adjacent metal atom. We are investigating reactions of low-valent metal-ligand groups with the salts (X-W(triple bond CR) (CO)₂ (eta 5-C₂B₉H₉Me₂) (X = NEt₄, R = C₆H₄Me-2 (1d) or C₆H₃Me₂-2,6 (1e); X = PPh₄, R = C₆H₃Me₂-2,6(1f)). It was anticipated that the presence in these salts of ortho substituents on the benzene ring would introduce modifications in the reactivity patterns of (1d)-(1f), compared with those of (1a)-(1c). Reprints.

AD-A200 218

AD-A200 218

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 213 12/2

AD-A200 212 12/1

ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS

ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS

(U) Continuity of Closest Rank-p Approximations to Matrices.

(U) On Continuation for Variational Inequalities.

AUG 87

DEC 87

PERSONAL AUTHORS: Mittelmann, Hans D.; Cadzow, James A.

PERSONAL AUTHORS: Mittelmann, H. D.

CONTRACT NO. AFOSR-84-0315

CONTRACT NO. AFOSR-84-0315

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A3

TASK NO. A3

MONITOR: AFOSR
TR-88-1131MONITOR: AFOSR
TR-88-1133

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Acoustics, Speech, and Signal Processing, VASSP-35 n8 p1211-1212 Aug 87.

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Numerical Analysis, v24 n6 p1374-1381 Dec 87.

ABSTRACT: (U) In signal processing, the singular value decomposition and rank characterization of matrices play prominent roles. The mapping which associates with any complex $m \times n$ matrix X its closest rank- p approximation X_p need not be continuous. When the p th and the $(p+1)$ st singular value of X are equal, this mapping maps, in fact a matrix to a set of matrices. Furthermore, an example is given to show that large errors in computing X_p superscript p can be expected when sigma sub p is sufficiently close to sigma sub $p+1$. It is finally shown that this mapping is closed in the sense of Zangwill. The property of closedness is an essential assumption of a global convergence proof for algorithms involving this mapping. Keywords: Matrix theory; Reprints. (JHD)

ABSTRACT: (U) While many continuation methods for the numerical solution of nonlinear eigenvalue problems for ordinary and partial differential equations have been proposed and successfully applied, little has been done so far for variational inequalities. On the basis of recent analytical results and previous work of the author a predictor-corrector combination is proposed for a class of obstacle problems which exhibit fold points on the variational inequality branch. Numerical results for the Bratu problem are presented and verify the effectiveness of the method which may be increased further by, for example, combining it with multigrid techniques. Keywords: Continuation methods, Predictor-corrector, Variational inequalities, Obstacle problems, Fold points. (JHD)

DESCRIPTORS: (U) *INEQUALITIES, EIGENVALUES, NONLINEAR ANALYSIS, VARIATIONAL METHODS, NUMERICAL ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS, SOLUTIONS(GENERAL).

DESCRIPTORS: (U) *MATRIX THEORY, ALGORITHMS, DECOMPOSITION, ERRORS, MAPPING(TRANSFORMATIONS), REPRINTS, SIGNAL PROCESSING.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A3, Singular value decomposition.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A3, Obstacle problems, Predictor corrector combination.

AD-A200 213

AD-A200 212

UNCLASSIFIED

PAGE 58

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 208 22/2 20/11

AD-A200 207 7/3

INTEGRATED SYSTEMS INC SANTA CLARA CA

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Adaptive Control Techniques for Large Space Structures.

(U) A New Route to 1,4-Disilabenzene and 1,4-Disilabarrelene,

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 88-31 May 87,

88

DEC 87

PERSONAL AUTHORS: Sekiguchi, Akira; Gillette, Gregory R.; West, Robert

PERSONAL AUTHORS: Kosut, Robert L.

REPORT NO. ISI-110

CONTRACT NO. F49620-88-C-0010

CONTRACT NO. F49620-85-C-0084

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. 82

TASK NO. 82

MONITOR: AFOSR TR-88-0873

MONITOR: AFOSR TR-88-0848

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organometallics, v7 p1228-1227 1988.

ABSTRACT: (U) This report summarizes the research performed on adaptive control techniques for Large Space Structures (LSS). The research effort concentrated on two areas: (1) on-line robust design from identified models - what is referred to here as adaptive calibration; and (2) an analysis of slow-adaptation for adaptive control of LSS. The report summarizes the results obtained in these areas and also includes Appendices which contain technical articles: (1) Adaptive Control of Large Space Structures; (2) Adaptive Control Via Finite Modeling and Robust Control; (3) On the use of the Method of Averaging for the Stability analysis of Adaptive Linear Control Systems; and (4) Conditions for the Convergence and Divergence of Parameter Adaptive Linear Systems. (JHD)

DESCRIPTORS: (U) *SPACE STATIONS, *ADAPTIVE CONTROL SYSTEMS, CALIBRATION, CONTROL SYSTEMS, LINEAR SYSTEMS, PARAMETERS, SPACECRAFT, STABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B2, LSS(Large Space Structures).

AD-A200 208

AD-A200 207

UNCLASSIFIED

PAGE 57

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 206 7/4

AD-A200 203 12/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

TEXAS A AND M UNIV COLLEGE STATION

(U) In-Situ Surface during Laser-Controlled Chemical Processing of Surfaces.

(U) Variance Functions and the Minimum Detectable Concentration in Assays.

DESCRIPTIVE NOTE: Final rept. May 88-Apr 88.

DESCRIPTIVE NOTE: Technical rept. no. 10, Aug 87-Aug 88.

JUN 88

AUG 88

PERSONAL AUTHORS: Campion, Alan

PERSONAL AUTHORS: Davidian, W.; Carroll, R. J.; Smith, W.

CONTRACT NO. AFOSR-88-0084

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2303

PROJECT NO. 2304

TASK NO. A2

TASK NO. A6

MONITOR: AFOSR
TR-88-0805

MONITOR: AFOSR
TR-88-0774

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments designed to assess the utility of several methods of surface analysis under reaction conditions are described. The goal of the research was to develop new methods with which to understand the mechanisms associated with the preparation of materials of electronic interest by chemical vapor deposition, with an emphasis on laser control of the reactions. The focus of the work was improve the sensitivity of unenhanced surface Raman spectroscopy through the combined use of ultraviolet lasers, Cassegrain optical systems and charge-coupled device detectors. Model systems to test these technical improvements were designed and an understanding of the factors that govern sensitivity has been achieved. Construction of a system for laser direct writing as well as the installation of a multipurpose surface analysis system are also described. Keywords: Unenhanced surface Raman spectroscopy; Surface chemistry; Electronic materials. (Jhd)

DESCRIPTORS: (U) *RAMAN SPECTROSCOPY, *SURFACE CHEMISTRY, CASSEGRAINIAN OPTICAL SYSTEMS, CHARGE COUPLED DEVICES, CHEMICAL REACTIONS, CONTROL, OPTICAL DETECTORS, ELECTRONIC EQUIPMENT, LASER APPLICATIONS, MODEL TESTS, MULTIPURPOSE, PREPARATION, SURFACE ANALYSIS, ULTRAVIOLET LASERS, VAPOR DEPOSITION, WRITING.

AD-A200 206

AD-A200 203

UNCLASSIFIED

PAGE 58

EVJ00F

ABSTRACT: (U) Assay data are often fitted by a nonlinear regression model incorporating heterogeneity of variance. Typically, the standard deviation of the response is taken to be proportional to a power Theta of the mean. There is considerable empirical evidence suggesting that for assays of a resolvable size, now one estimates the parameter Theta does not greatly affect how well one estimates the mean regression function. An additional component of assay analysis is the estimation of auxiliary constructs such as the minimum detectable concentration, for which many definitions exist; we focus on one such definition. The minimum detectable concentration depends both on Theta and the mean regression function. We compare standard methods of estimating the parameter Theta. When duplicate counts are taken at each concentration, the first method is only 20% efficient asymptotically in comparison to the fourth for normal data, and in an example the resulting estimate of the minimum detectable concentration is asymptotically 3.7 times more variable. Less dramatic results obtain for the second and third estimators compared to the fourth. Simulation results and an example support the asymptotic theory. The results have implications in applications other than the assay problem in which heterogeneity of variance and issues of calibration arise. Keywords: Calibration, Generalized least squares.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 203 CONTINUED

AD-A200 202 7/2 11/2

Heteroscedasticity prediction, Weighted least squares.
(jhd)

MICHIGAN UNIV ANN ARBOR

DESCRIPTORS: (U) *ASSAYING, *DATA REDUCTION, ASYMPTOTIC
SERIES, CALIBRATION, COUNTING METHODS, ESTIMATES,
HETEROGENEITY, LEAST SQUARES METHOD, MATHEMATICAL MODELS,
MEAN, NONLINEAR ANALYSIS, NONLINEAR SYSTEMS, REGRESSION
ANALYSIS, SIMULATION, STANDARD DEVIATION, ANALYSIS OF
VARIANCE, WEIGHTING FUNCTIONS.

(U) Mechanistic Studies of Pressure-Assisted
Superplasticity of Structural Ceramics.

DESCRIPTIVE NOTE: Scientific rept. 15 Jun 87-14 Jun 88.

JUL 88

PERSONAL AUTHORS: Chen, I-Wei

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A6,
Heteroscedasticity.

REPORT NO. UMSC-88-C-AF-2

CONTRACT NO. AFOSR-87-0289

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-88-0918

UNCLASSIFIED REPORT

ABSTRACT: (U) Superplastic flow in silicon nitride
ceramics containing YAG was investigated. A low flow
stress was found possible when the solid SIALON grains
are included in the liquid phase YAG above a critical
temperature. The mechanisms of grain growth and
microstructural development in silicon nitride and
zirconia were studied. The effect of Manganese addition
on lowering the forming temperature of zirconia was
demonstrated. (mjn)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *YTTRIUM ALUMINUM
GARNET, *ZIRCONIUM OXIDES, *SILICON NITRIDES, ADDITION,
CRITICAL TEMPERATURE, FLOW, GRAIN GROWTH, LIQUID PHASES,
MANGANESE, MICROSTRUCTURE.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 201 6/4 6/1

AD-A200 201 CONTINUED

BAYLOR COLL OF MEDICINE HOUSTON TX

(U) Amino Neurotransmitter Regulation of Long-Term
Synaptic Plasticity in Hippocampus.

DESCRIPTIVE NOTE: Final rept. 1 Apr 85-31 Mar 88,

JUN 88

PERSONAL AUTHORS: Johnston, Daniel

CONTRACT NO. AFOSR-85-0173

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-0620

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of this project was to investigate the mechanisms of long-term synaptic potentiation (LTP) at mossy fiber synapses in hippocampus, with particular emphasis on the modulation of LTP by amine neurotransmitters. During the first year of this grant, several studies were completed in which a number of hypotheses were tested for the mechanisms of LTP. We found that LTP of the mossy fiber synapses is due to an increase in the excitatory synaptic conductance with little or no change in the excitatory synaptic reversal potential, the inhibitory synaptic conductance, or the membrane properties of the postsynaptic neuron. During the first and second years, we explored the neuromodulation of LTP of LTP by norepinephrine (NE). NE enhances the magnitude, duration, and probability of induction of LTP at mossy fiber synapses. During the second and third years, we explored the membrane actions of NE that could mediate the enhancement of LTP studies. We used a newly developed preparation of acutely exposed hippocampal neurons and patch clamp techniques. We found that NE, through beta adrenoceptors and cyclic AMP, increased the activity of single calcium channels. During the third year, we explored the neuromodulation of LTP by muscarinic cholinergic receptors. Muscarine depresses LTP at mossy fiber synapses. We have steadily progressed in our development of single cell computer models for

AD-A200 201

UNCLASSIFIED

AD-A200 201

PAGE 60

EVJ00F

simulating the behavior of hippocampal neurons. (aw)

DESCRIPTORS: (U) *HIPPOCAMPUS, *NERVE TRANSMISSION, *NEUROMUSCULAR TRANSMISSION, *SYNAPSE, ADENOSINE PHOSPHATES, AMINES, BEHAVIOR, CALCIUM, CELLS, CHANNELS, CHOLINERGIC NERVES, CLAMPS, COMPUTERIZED SIMULATION, CONDUCTIVITY, CYCLIC COMPOUNDS, EXPOSURE(GENERAL), HYPOTHESES, INDUCTION SYSTEMS, INHIBITION, LEVARTERENOL, LONG RANGE(TIME), MEMBRANES, MODULATION, MUSCARINE, NERVE CELLS, PLASTIC PROPERTIES, PROBABILITY, RECEPTION, REGULATIONS, REVERSIBLE, SENSE ORGANS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2, *LTP(LONG TERM SYNAPTIC POTENTIATIVE).

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 200 12/5

AD-A200 199 7/2 8/1

CORNELL UNIV ITHACA NY

MEDICAL COLL OF VIRGINIA RICHMOND DEPT OF NEUROLOGY

(U) Symbolic Processor Based Models of Neural Networks.

(U) The Effects of Hydrazines on Neuronal Excitability.

DESCRIPTIVE NOTE: Final rept. 1 Oct 88-31 Mar 88,

DESCRIPTIVE NOTE: Annual rept. 1 May 87-31 May 88,

MAY 88

JUN 88

PERSONAL AUTHORS: Gardner, Daniel

PERSONAL AUTHORS: DeLorenzo, Robert J.

CONTRACT NO. AFOSR-87-0017

CONTRACT NO. AFOSR-87-0235

PROJECT NO. 2817

PROJECT NO. 2312

TASK NO. A4

TASK NO. A5

MONITOR: AFOSR
TR-88-0921MONITOR: AFOSR
TR-88-0929

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Symbolics and Apple computer systems to enhance neural network modeling research were provided under this Defense University Instrumentation Program grant. The Symbolics hardware has been operational for some time, but appropriate software is still under development. There have been three revisions of system software since the grant proposal was written. Furthermore, object-oriented programming is to be used for at least one major project, and this was begun using the currently most advanced system, Flavors. However, Flavors is scheduled to be superseded in the near future by a newer Common Lisp object-oriented programming system, and the project has been delayed until this software is released to researchers. (JHD)

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *NEURAL NETS, *SYMBOLIC PROGRAMMING, COMPUTER PROGRAMS, MODELS, PROCESSING EQUIPMENT.

IDENTIFIERS: (U) PE61102F, WJAFOSR2S17A4, FLAVORS computer program.

ABSTRACT: (U) Hydrazines are toxic compounds with military and industrial applications including use as missile propellants for aircraft (i.e. the F-16 and space vehicles). Recurrent exposure from routine storage, use, and disposal hydrazines makes their toxic effects on the nervous system important. Exposure to hydrazine can result in status epilepticus and eventual respiratory collapse. Acute exposure can produce repeated tonic-clonic seizures in both animal and man. This project has continued to direct its effort in understanding the molecular mechanism by which hydrazines may produce their neuronal excitatory effects. Our investigation focuses on the effects of hydrazine on electrophysiological properties of identified neurons in the invertebrate *Hermissenda Grassicornis*. We have documented that hydrazines increase neuronal excitability in the LP-1 neuron of this nudibranch mollusc. Hydrazines also increase the rate of sustained repetitive firing in this system. We will study molecular mechanism mediating the effects of hydrazine on increased neuronal firing in isolated neurons. Specific anticonvulsant drugs may have potential benefit in blocking the excitable effects of hydrazine on neuronal activity. Keywords: Neuronal excitability; Hydrazine; Calcium. (mjm)

DESCRIPTORS: (U) *HYDRAZINES, *MOTOR NEURONS, *NERVE CELLS, *TOXICITY, AIRCRAFT, ANTICONVULSANTS, CALCIUM,

AD-A200 200

AD-A200 199

UNCLASSIFIED

PAGE 61 EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 199 CONTINUED

COLLAPSE, DISPOSAL, DRUGS, ELECTROPHYSIOLOGY, EXCITATION, EXPOSURE(GENERAL), GUIDED MISSILES, INDUSTRIES, ISOLATION, MILITARY APPLICATIONS, MOLECULES, NERVOUS SYSTEM, PROPELLANTS, RESPIRATORY SYSTEM, SPACECRAFT, STORAGE.

IDENTIFIERS: (U) PE811026, WJAFOSR2312A5.

AD-A200 198 6/4 12/9

SRI INTERNATIONAL MENLO PARK CA

(U) Role of Retinocortical Processing in Spatial Vision.

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 May 87-1 May 88,

JUN 88

PERSONAL AUTHORS: Kelly, Donald H.

CONTRACT NO. F49620-87-K-0009

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-88-0806

UNCLASSIFIED REPORT

ABSTRACT: (U) Several important image-processing functions have been proposed for the geometric distortion known as cortical (or more precisely, retinocortical) magnification. This spatial distortion can convert the radial velocities projected on the retina by egocentric motion into uniform, rectilinear motion at the cortex. It can also convert changes of size and orientation in retinal coordinates into mere translation at the cortex. (In both cases, an image-like property is converted into a map-like property.) Thus cortical magnification must play an essential role in forming our stable precepts of the world around us, even as it vexes the question of how the information from different fixations within the same scene can be arranged into a single precept. Is the cortical image subsequently undistorted, just to facilitate the superposition of multiple fixations? An understanding of the image-coding functions of the primary visual cortex (V1) should help to unravel this paradox. Using the tools of computer vision (LISP algorithms developed on Symbolics networks), we are attempting to build a working model that includes such processes as: fixational eye movements, retinal filtering and inhomogeneity, retinocortical mapping, cortical (Gabor) image-coding, and other processes involved in the coordinate shifts needed for mapping purposes. (aw)

DESCRIPTORS: (U) *IMAGE PROCESSING, *RETINA, *VISION.

AD-A200 199

AD-A200 198

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 198 CONTINUED

*VISUAL CORTEX, *COMPUTERIZED SIMULATION, ALGORITHMS, COMPUTERS, COORDINATES, DISTORTION, EYE MOVEMENTS, FILTERS, FUNCTIONS, GEOMETRY, HETEROGENEITY, MAGNIFICATION, MODELS, RADIAL VELOCITY, SHIFTING, SIZES(DIMENSIONS), SPATIAL DISTRIBUTION, TOOLS, TRANSLATIONS, ARTIFICIAL INTELLIGENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5, LPN-SRI-3558,
*Computer vision.

AD-A200 197 7/3

SAN DIEGO STATE UNIV CA DEPT OF CHEMISTRY

(U) Mechanism of the Thermal Decomposition of Dimethylsilane at Atmospheric Pressures in the Gas Phase,

88

PERSONAL AUTHORS: O'Neal, H. E.; Ring, M. A.

CONTRACT NO. AFOSR-83-0209

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0874

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organometallics, v7 n5 p1017-1025 1988.

ABSTRACT: (U) A mechanism for the gas-phase, high pressure thermal decomposition of dimethylsilane is proposed which explains in a kinetically reasonable way the production of the complex linear and cyclic carbosilane products observed for this reaction. The mechanism is based on unimolecular and bimolecular reactions of silylenes, which (with one exception) are all well-known or previously proposed processes. A crude modeling of the dimethylsilane pyrolysis, using assigned rate constants derived from reported Arrhenius parameters (or an analogy with reported parameters) or from thermochemical kinetic considerations in the absence of such data, is shown to be in reasonable agreement with the experimental data. Keywords: Silanes, Reprints. (MUM)

DESCRIPTORS: (U) *SILANES, *VAPOR PHASES, ARRHENIUS EQUATION, BAROMETRIC PRESSURE, CONSTANTS, EXPERIMENTAL DATA, HIGH PRESSURE, METHYL RADICALS, MODELS, PARAMETERS, PRODUCTION, PYROLYSIS, RATES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2,
*DIMETHYLSILANES.

AD-A200 198

AD-A200 197

UNCLASSIFIED

PAGE 63

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 196

7/4

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) AM1 Calculations for Compounds Containing Boron,
88

PERSONAL AUTHORS: Dewar, Michael J.; Jie, Caixian;
Zoeblisch, Eve G.

CONTRACT NO. AFOSR-88-0022

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0875

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organometallics, v 7 n2 p513-521 1988.

ABSTRACT: (U) AM1 has been parametrized for boron. Calculations are reported for an extensive set of boron-containing compounds. Most of the results are better than those given by MNDO. AM1 is especially successful in dealing with boron hydrides containing three-center bonds with bridging hydrogen atoms. Studies of some reactions of boron compounds have given satisfactory results. Keywords: Heat of formation; Dipole moment; Ionization potential; Activation energy. Reprints. (AW)

DESCRIPTORS: (U) *BORON COMPOUNDS, *CHEMICAL REACTIONS, *QUANTUM CHEMISTRY, ACTIVATION ENERGY, ATOMS, BORON, BORON HYDRIDES, DIPOLE MOMENTS, HEAT OF FORMATION, HYDROGEN, IONIZATION POTENTIALS, REPRINTS, CHEMICAL BONDS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2.

AD-A200 196

UNCLASSIFIED

AD-A200 195

PAGE 64 EVJ00F

AD-A200 195

7/3

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Dialkylaminophosphorus Metal Carbonyls. 7. Trinuclear Iron Carbonyl Derivatives from Reactions of Disodium Octacarbonyldiferrate with (Dialkylamino) Dichlorophosphines.
88

PERSONAL AUTHORS: King, R. B.; Chorghade, G. S.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0877

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v341 p407-414 1988.

ABSTRACT: (U) Reactions of Na₂(Fe₂(CO)₈) with R₂NPCl₂ (R = Me, Et, CHMe₂ or cyclohexyl (Cx)); R₂N = piperidino, 2,6-dimethylpiperidino or 2,2,6,6-tetramethylpiperidino) give orange ((R₂NP)2Fe₃(CO)₈) and dark purple ((R₂NP)Fe₃(CO)₁₀) as the only hexane-soluble iron carbonyl derivatives. No evidence was obtained for the formation of any ((R₂NP)2CO)Fe₂(CO)₈ or ((R₂NP)3Fe₂(CO)₈) derivatives in significant quantities. Keywords: Iron, Octacarbonyldiferrate, Metal carbonyls, Dialkylaminophosphorus derivatives, Metal phosphorus compounds, Reprints. (MJM)

DESCRIPTORS: (U) *METAL CARBONYLS, *ORGANIC PHOSPHORUS COMPOUNDS, IRON, REPRINTS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2, *Carbonyls/dialkylaminophosphorus metal.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 194 7/3 7/4 18/2

AD-A200 183 5/1 11/6 11/2 11/4
4/1

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

NATIONAL ACADEMY OF SCIENCES-NATIONAL RESEARCH COUNCIL
WASHINGTON DC

(U) Mechanism of the 1,5-Sigmatropic Hydrogen Shift in 1,3-Pentadiene.

(U) National Research Council Resident Research
Associateship (NRC-RRR) Program.

88

PERSONAL AUTHORS: Dewar, Michael J.; Healy, Eamonn F.;
Ruiz, James M.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 87-30 Jun 88.

AUG 88

CONTRACT NO. AFOSR-88-0022

CONTRACT NO. F49620-85-C-0124

PROJECT NO. 2303

PROJECT NO. 2308

TASK NO. B2

TASK NO. D8

MONITOR: AFOSR
TR-88-0876MONITOR: AFOSR
TR-88-1142

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical
Society, v110 p2866 1988.ABSTRACT: (U) A kinetic isotope effect of 2.53 at the
MP2/3-21G level has been calculated for the 1,5-
sigmatropic shift of cis-1,3-pentadiene, close to the PHF/
3-21G value (2.52). Neglect of correlation does not
therefore account for the poor agreement of the latter
with experiment, as Jensen and Houk have suggested. The
results support the suggestion by Dewar et al, that
vibrationally assisted tunnelling (VAT) is involved.
Keywords: Activation energy. Reprints. (AW)DESCRIPTORS: (U) *ISOTOPE EFFECT, *PENTADIENES,
ACTIVATION ENERGY, REACTION KINETICS, REPRINTS, TUNNELING,
MOLECULAR VIBRATION, MOLECULAR STRUCTURE, SHIFTING,
HYDROGEN.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B2.

DESCRIPTORS: (U) *RESEARCH MANAGEMENT, AIR FORCE, AIR
FORCE SYSTEMS COMMAND, CERAMIC MATERIALS, COMPOSITE
MATERIALS, METALLURGY, UPPER ATMOSPHERE.

IDENTIFIERS: (U) PE81102F, WJAFOSR2308D8.

AD-A200 194

AD-A200 183

UNCLASSIFIED

PAGE 65

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 181 12/3

AD-A200 145 1/3.1

TEXAS A AND M UNIV COLLEGE STATION

TEXAS A AND M UNIV COLLEGE STATION DEPT OF MECHANICAL ENGINEERING

(U) A Note on Computing Robust Regression Estimates via Iteratively Reweighted Least Squares,

(U) Nonlinear Dynamic Responses of Composite Rotor Blades.

MAY 88

DESCRIPTIVE NOTE: Final technical rept. 1 Dec 85-Jun 88.

PERSONAL AUTHORS: Street, James O.; Carroll, Raymond J.; Ruppert, David

AUG 88

PERSONAL AUTHORS: Engblom, John J.; Ochoa, Ozden O.

CONTRACT NO. F49620-85-C-0144, \$NSF-MCS81-00748

REPORT NO. ME-5375-88

PROJECT NO. 2304

CONTRACT NO. F49620-88-K-0003

TASK NO. A5

PROJECT NO. 2302

MONITOR: AFOSR
TR-88-0982

TASK NO. B1

UNCLASSIFIED REPORT

MONITOR: AFOSR
TR-88-1018

SUPPLEMENTARY NOTE: Pub. in the American Statistician, v42 n2 p152-154 May 88. Supersedes report dated Feb 87, AD-A186 709.

UNCLASSIFIED REPORT

ABSTRACT: (U) The 1985 SAS User's Guide: Statistics provides a method for computing robust regression estimates using iterative reweighted least squares and the nonlinear regression procedure NLIN. The estimates are asymptotically correct, although the resulting standard errors are not. The computation of the estimates is also discussed. Reprints. See ADA186709. (JHD)

DESCRIPTORS: (U) *LEAST SQUARES METHOD, *REGRESSION ANALYSIS, COMPUTATIONS, ERRORS, ESTIMATES, WEIGHTING FUNCTIONS, NONLINEAR ANALYSIS, REPRINTS, ITERATIONS, USER MANUALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, Robust procedures, NLIN algorithm.

ABSTRACT: (U) Summarized are research activities related to Nonlinear Dynamic Response of Composite Rotor Blades. Fundamental to the analysis is the development of a continuum formulation that can accurately account for the effects of interlaminar shear and interlaminar normal stress variation thru-the-thickness of a laminate. Technical highlights of the research efforts to date are presented for each of the proposed tasks; namely, Nonlinear Displacement Formulation for Composite Media, Incorporate Damage Mechanisms into Dynamic Response Formulation and Correlation of Formulated Response Model with Experimental data. Keywords: Composite materials; Nonlinear dynamic response; Damage Mechanisms; Finite elements; Large displacement formulation; Interlaminar shear; Normal stresses; Assumed displacement; Hybrid models. (JES)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *ROTOR BLADES, *HELICOPTERS, COMPOSITE STRUCTURES, DAMAGE, DISPLACEMENT, DYNAMIC RESPONSE, EXPERIMENTAL DATA, FINITE ELEMENT ANALYSIS, FORMULATIONS, MEDIA, MODELS, NONLINEAR ANALYSIS, NONLINEAR SYSTEMS, RESPONSE, STRESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

AD-A200 181

AD-A200 145

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 134 8/4

AD-A200 134 CONTINUED

SOCIETY FOR RESEARCH ON BIOLOGICAL RHYTHMS
CHARLOTTEVILLE VA

NEUROLOGY, OSCILLATORS, PACEMAKERS, PHOTOPERIODISM,
PROTEINS, RETINA, SLEEP, STABILIZATION, SYMPOSIA,
TRANSPLANTATION, VERTEBRATES.

(U) Society for Research on Biological Rhythms (1st) Held
on May 11-14, 1988 in Charleston, South Carolina.

IDENTIFIERS: (U) WJAFOSR2312A12, PE81102F.

DESCRIPTIVE NOTE: Final rept. 1 May-10 Aug 88,

AUG 88

PERSONAL AUTHORS: Turek, Fred W.

CONTRACT NO. AFOSR-88-0133

PROJECT NO. 2312

TASK NO. A12

MONITOR: AFOSR
TR-88-1005

UNCLASSIFIED REPORT

ABSTRACT: (U) Partial contents: Organization of Animal Circadian Systems; Pulsatile Rhythms of Neuroendocrine Function; Neural Transplants and Restoration of Circadian Function; Stabilization of Periodic Processes Through Coupling of Oscillators; Photic Effects on Pacemakers; Pineal and Retinal Oscillators In Vitro; Computerized Data Acquisition; Involvement of Protein Synthesis in Circadian Rhythm Generation; Mechanisms of Vertebrate Pacemakers; Photoperiodism and Seasonal Rhythms; Human Rhythms and Sleep. Pharmacological Manipulation of Rhythms; Cellular, Molecular and Genetic Dissection of Clocks; Interaction Between Sleep and the Circadian System; Entraining Effects of Melatonin; Use of Periodogram Analysis and Related Procedures in Biological Rhythms Studies; Use of In Vitro Brain Slices in Studies of Circadian Function; Modulation and Control of Neural Oscillators; Chronobiology of Depression; Cellular and Molecular Basis of Rhythmicity; and Comparative Analysis of Rhythms. Keywords: Symposia. (AW)

DESCRIPTORS: (U) *BIOLOGICAL RHYTHMS, ANIMALS, BIOSYNTHESIS, BRAIN, CIRCADIAN RHYTHMS, CLOCKS, COMPUTER APPLICATIONS, CONTROL, COUPLING(INTERACTION), DATA ACQUISITION, DISSECTION, ENDOCRINE GLANDS, FUNCTIONS, GENETICS, IN VITRO ANALYSIS, MODULATION, NERVOUS SYSTEM,

AD-A200 134

AD-A200 134

UNCLASSIFIED

PAGE

57

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 120 CONTINUED

PENNSYLVANIA STATE UNIV UNIVERSITY PARK MATERIALS
RESEARCH LAB

(U) Microstructure, Porosity and Mechanical Property
Relationships of Calcium-Silicate-Hydrate.

DESCRIPTIVE NOTE: Annual rept. 15 Dec 87-14 May 88.

AUG 88

PERSONAL AUTHORS: Grutzeck, Michael W.; Hoyle, Susan Q.;
Brevai, Elise; Das Gupta, Avajjit

REPORT NO. PSU-AFOSR-88-2

CONTRACT NO. AFOSR-87-0395

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-1025

UNCLASSIFIED REPORT

ABSTRACT: (U) It is well known that characteristics of hydrated calcium aluminosilicate materials (macrodefect-free, silica-enriched cement) are directly related to the bulk composition of the starting materials which dictate the phases developing during the hydration process. Although countless examples of this empirical relationship can be found in the literature, very little in terms of a systematic study of phase, morphology, and intrinsic property relations are actually available. At this time, seven glasses will serve as simplified starting materials for ongoing solution and paste hydration studies. The experiments will provide insight into kinetics of reaction, phase development and microstructure paralleling that which occurs in high-strength construction materials such as structural concrete and other less traditional chemically bonded ceramics. Our objectives is to begin to understand the nature of microstructure, porosity and mechanical property relationships of calcium silicate hydrate and its coexisting phases. By delineating phase relations among these largely amorphous, gel-like materials it may then be possible to engineer these materials for a

AD-A200 120

UNCLASSIFIED

AD-A200 120

PAGE 68

EVJ00F

variety of purposes. For example, using simple hydration and low temperature processing, it may be possible to produce low-cost nanometer composite materials which may prove to be stronger and more durable than the more conventional portland cement-based materials now available. (AW)

DESCRIPTORS: (U) *CEMENTS, *MICROSTRUCTURE, *POROSITY, CALCIUM COMPOUNDS, CERAMIC MATERIALS, CHEMICAL BONDS, COMPOSITE MATERIALS, CONCRETE, CONSTRUCTION MATERIALS, HIGH STRENGTH, HYDRATES, HYDRATION, REACTION KINETICS, LOW TEMPERATURE, MECHANICAL PROPERTIES, PROCESSING, SILICATES, SIMPLIFICATION, STRUCTURAL PROPERTIES, ENDURANCE(GENERAL).

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 119 20/4

AD-A200 119 CONTINUED

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

THREE DIMENSIONAL FLOW, TURBULENCE, TURBULENT FLOW,
VELOCITY.

(U) Development and Application of Oxygen Flow Tagging for
Velocity Measurements and Flow Visualization in
Turbulent Three-Dimensional Supersonic Flows.

IDENTIFIERS: (U) PE81102F, WUAFOSR2307A2, Laser
diagnostics.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 87-31 May
88,

SEP 88

PERSONAL AUTHORS: Miles, Richard B.

CONTRACT NO. AFOSR-86-0181

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-88-1153

UNCLASSIFIED REPORT

ABSTRACT: (U) Demonstration is presented of the oxygen
flow tagging under conditions which duplicate the Mach 3
facility. These tests were done in an underexpanded
axisymmetric jet up to Mach 4. Velocity data was taken
through the core and across the free shear layer of this
jet and images were generated of instantaneous flow
structure from which are computed the average velocity
profiles, turbulence intensity, and the axial velocity
correlations. Simultaneous two-line flow tagging was done
that data was used to generate stream-wise velocity
correlations in the same axisymmetric jet. The data which
has been generated has been compared with a high-speed
subsonic jet to give us a quantitative measure of the
difference between supersonic and subsonic turbulence.
Keywords: Flow diagnostics, Velocity measurements,
Temperature measurements, Density measurements, Laser
diagnostics, Supersonic flows. (JHD)

DESCRIPTORS: (U) *FLOW VISUALIZATION, *SUPERSONIC FLOW,
CORRELATION, DENSITY, DIAGNOSIS(GENERAL), MACH NUMBER,
TRACER STUDIES, INTENSITY, LASER APPLICATIONS, LAYERS,
MEASUREMENT, OXYGEN, PROFILES, SHEAR PROPERTIES,
SUPERSONIC CHARACTERISTICS, SYNCHRONISM, TEMPERATURE,

AD-A200 119

AD-A200 119

UNCLASSIFIED

PAGE 69

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 118 11/2 11/3

ARIZONA UNIV TUCSON

(U) Ceramics Derived from Organo-Metallic Polymers.

DESCRIPTIVE NOTE: Final technical rept. 1 Dec 86-30 Nov 87,

JUL 88

PERSONAL AUTHORS: Uhlmann, D. R.

CONTRACT NO. AFOSR-87-0107

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-1069

UNCLASSIFIED REPORT

ABSTRACT: (U) Work carried out was directed to several areas. All involved the use of organo metallic precursors to produce novel ceramic and glass materials. The areas of principal activity included the following: (1) Polytetrafluoroethylene-silicate composites via sol-gel processing; (2) Fluoropolymer modified silicate glasses; (3) sintering behavior of sol-gel derived anorthite and cordierite glass powders; (4) coating pretreatment effects in thermally nitrided sol gel silica coatings; and (5) sol gel derived coatings. (MJW)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *FLUOROPOLYMERS, *GLASS, *ORGANOMETALLIC COMPOUNDS, *POLYMERS, *SILICON DIOXIDE, BEHAVIOR, COATINGS, GELS, MINERALS, POWDERS, PRECURSORS, SILICATES, SINTERING.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, *Anorthite, *Cordierite.

AD-A200 078 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Diffusion Equations in Duals of Nuclear Spaces.

DESCRIPTIVE NOTE: Technical rept. Sep 87-Aug 88.

JUL 88

PERSONAL AUTHORS: Kallianput, G.; Mitoma, I.; Wolpert, R. L.

REPORT NO. TR-234

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-1143

UNCLASSIFIED REPORT

ABSTRACT: (U) A stochastic Galerkin method is used to establish the existence of a solution to a martingale problem posed by an Ito type stochastic differential equation for processes taking values in the dual of a nuclear space. Uniqueness of the strong solution is also shown using the monotonicity condition. An application to the motion of random strings is discussed. Keywords: Nuclear spaces, Diffusion, Martingale problem, Galerkin method. (JHD)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, DIFFERENTIAL EQUATIONS, DIFFUSION.

IDENTIFIERS: (U) Galerkin method, Martingales, Nuclear spaces.

AD-A200 118

AD-A200 078

UNCLASSIFIED

PAGE 70

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 077 12/3

AD-A200 078 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Harmonizability, V-Boundedness, (2P)-Boundedness of Stochastic Processes.

(U) A Counterexample Concerning the External Index.

DESCRIPTIVE NOTE: Rept. for 1 Sep 87-31 Aug 88,

DESCRIPTIVE NOTE: Rept. for 1 Sep 87-31 Aug 88,

AUG 88

AUG 88

PERSONAL AUTHORS: Houdre, Christian

PERSONAL AUTHORS: Smith, Richard L.

REPORT NO. TR-238

REPORT NO. TR-237

CONTRACT NO. F49820-85-C-0144

CONTRACT NO. F49820-85-C-0144

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A8

TASK NO. A8

MONITOR: AFOSR TR-88-1089

MONITOR: AFOSR TR-88-1098

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Some new classes of discrete time non-stationary processes, related to the harmonizable and V-bounded classes, are introduced. A few characterizations are obtained which, in turn, unify the V-bounded theory. Our main results depend on a special form of Grothendieck inequality. (JHD)

ABSTRACT: (U) The concept of an extremal index, which is a measure of local dependence amongst the exceedances over a high threshold by a stationary sequence, has a natural interpretation as the reciprocal of mean cluster size. A counterexample is exhibited which shows that this interpretation is not necessarily correct. Keywords: Poisson density function; Point processes; Stochastic processes. (Jhd)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *INEQUALITIES,

DESCRIPTORS: (U) *POISSON DENSITY FUNCTIONS, *STOCHASTIC PROCESSES, POINTS(MATHEMATICS), CLUSTERING, EXTERNAL, INDEXES, MEAN, SEQUENCES, SIZES(DIMENSIONS), STATIONARY, THRESHOLD EFFECTS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A8, Grothendieck inequality, Nonstationary processes.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A8, Extremal index.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 075 7/3 7/8

AD-A200 074 7/2 7/3

UNIVERSITY OF SOUTHERN MISSISSIPPI HATTIESBURG

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Novel Liquid Crystals - Polymers and Monomers - As Nonlinear Optical Materials.

(U) Investigations of the Optical and Electronic Properties of Crystalline Organic Materials.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Dec 87,

DESCRIPTIVE NOTE: Annual rept. 15 Jun 87-14 Jun 88,

DEC 87

PERSONAL AUTHORS: Griffin, Anselm C., III

AUG 88

PERSONAL AUTHORS: Forrest, Stephen R.

CONTRACT NO. AFOSR-84-0268

CONTRACT NO. AFOSR-87-0273

PROJECT NO. 2303

PROJECT NO. 2308

TASK NO. A3

TASK NO. B1

MONITOR: AFOSR TR-88-1088

MONITOR: AFOSR TR-88-1017

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress is reviewed on research into the design, synthesis and characterization of, primarily, side chain liquid crystalline polymers for nonlinear optics. Materials described are polyesters and vinyl polymers and copolymers having push-pull pi-electronic nio structures as pendant groups. Chiral derivatives have also been prepared. The nio species employed have been nitroaromatics and pyridine N-oxides. Results of collaborative efforts in further characterization (electrooptic, dielectric, Langmuir-Blodgett films) are described. Keywords: Nonlinear optical materials; Liquid crystals; Polymers. (mjm)

DESCRIPTORS: (U) *AROMATIC COMPOUNDS; *LIQUID CRYSTALS, *NITRO RADICALS, *POLYMERS, COPOLYMERS, MONOMERS, NONLINEAR SYSTEMS, OPTICAL MATERIALS, OPTICS, SYNTHESIS(CHEMISTRY), VINYL PLASTICS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3.

AD-A200 075

UNCLASSIFIED

PAGE 72 EVJ00F

ABSTRACT: (U) A theory regarding transport of charge across crystalline molecular organic semiconductor/inorganic semiconductor heterojunctions is developed. It is found that transport under reverse bias, and under low forward bias is determined by carrier diffusion through the organic layer, and by thermionic emission across the heterojunction energy band discontinuity. Using the results of this theory, the valence band discontinuity energy between 3,4,9,10 perylenetetracarboxylic dianhydride and p-Si is directly measured using energy barrier photoemission spectroscopy and the analysis of the temperature dependence of the current-voltage data for this materials system. Apparently, this represents the first measurement of the band offsets between a molecular semiconductor and an inorganic semiconductor, and indicates the existence of relatively trap free heterointerfaces with many potential optical and electrical device applications. Additionally, an organic MBE system is described. Keywords: Heterojunction; Molecular semiconductor; Organic semiconductor. (mjm)

DESCRIPTORS: (U) *HETEROJUNCTIONS, *ORGANIC MATERIALS, *PHOTOELECTRIC EMISSION, *SEMICONDUCTORS, *SILICON, *CARBOXYL GROUPS, *ANHYDRIDES, BARRIERS, BIAS, CRYSTALS, DIFFUSION, DISCONTINUITIES, ELECTRIC CURRENT, ELECTRONICS,

AD-A200 074

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 074 CONTINUED

ENERGY, ENERGY BANDS, FORWARD AREAS, INORGANIC MATERIALS, LAYERS, MATERIALS, MEASUREMENT, MOLECULES, OPTICAL PROPERTIES, SPECTROSCOPY, THERMAL PROPERTIES, THERMIONIC EMISSION, VALENCE BANDS, VOLTAGE.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308B1, *Anhydride/3,4, 9,10-perylenetetracarboxylic di.

AD-A200 073 8/4 5/8

MICHIGAN UNIV ANN ARBOR DEPT OF PHYSIOLOGY

(U) Modulation of Thalamic Somatosensory Neurons by Arousal and Attention.

DESCRIPTIVE NOTE: Final rept. 1 Aug 87-31 Jul 88.

AUG 88

PERSONAL AUTHORS: Morrow, Thomas J.

CONTRACT NO. AFOSR-85-0286

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-1024

UNCLASSIFIED REPORT

ABSTRACT: (U) Several directions have been pursued toward the achievement of our research goals. We have continued to record the somatosensory responses in trained and untrained monkeys, looking for modulation related to both the state of arousal and to various aspects of the attention paradigm. Experiments have been conducted toward developing the techniques required to determine corticothalamic mechanisms are responsible for this modulation. Some of the results reported here concerning the effects of arousal state on thalamic somatosensory processing are currently in press. The stereotaxic atlas developed for this study has been further enhanced to include a horizontal view of thalamic structures. HISTAT, the statistical program for intra- and inter-histogram analysis has been upgraded to include additional statistical comparisons. (AW)

DESCRIPTORS: (U) *NERVE CELLS, HISTOGRAMS, MODULATION, MONKEYS, STATISTICS, TRAINING.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A2, SOMATOSENSORYNEURONS.

AD-A200 074

AD-A200 073

UNCLASSIFIED

PAGE 73

EVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 065 CONTINUED

AD-A200 065 7/3

BRISTOL UNIV (ENGLAND) DEPT OF INORGANIC CHEMISTRY

IDENTIFIERS: (U) *Cobalt/octacarbonyl di.

(U) Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 75. Reactions of Octacarbonyldicobalt with the Salts (X)(W(triple bond CR)(CO)2(eta 5-C2B9H9Me2)) (X = NEt4 or PPh4; R = Me, Ph, C6H4Me-2, or C6H4Me-4); Crystal Structure of (PPh4)(Co2W(mu sub 3-CPh)(CO)8(eta 5-C2B9H9Me2)). O.5CH2Cl2.

88

PERSONAL AUTHORS: Baumann, Franz-Erich; Howard, Judith A.; Musgrove, Rupert J.; Sherwood, Paul; Stone, F. G.

CONTRACT NO. AFOSR-88-0125

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0957

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Dalton Transactions: Inorganic Chemistry, p1891-1897 1988.

ABSTRACT: (U) Salts containing the anions (W(=CR)(CO)2(n5-C2B9H9Me2))-(R = alkyl or aryl) are becoming increasingly useful in the synthesis of compounds wherein tungsten is bonded to another transition element. The C=W groups in the alkylidene-tungsten species can co-ordinate either to neutral or to cationic metal ligand fragments forming, respectively, anionic or neutral polynuclear metal complexes. Moreover, a most interesting feature of some of these syntheses is the non-spectator role played by the carbaborane ligand. In this paper we further extend this area of chemistry by describing reactions of (Co2(CO)8) with the compounds (X)(W(=CR)(CO)2(n5-C2B9H9Me2)) (1; X = NEt4, R = Me, Ph, C6H4Me-4, C6H4Me-2, or C6H3Me-2,6; X = PPh4, R = Ph)3. Keywords: Reprints, Cobalt, Compounds. (MUM)

DESCRIPTORS: (U) *CARBENES, *COBALT, *METAL COMPLEXES, *TRANSITION METALS, *TUNGSTEN, ANIONS, BONDING, BRIDGES, CHEMISTRY, CRYSTAL STRUCTURE, LIGANDS, REPRINTS, SYNTHESIS(CHEMISTRY).

AD-A200 065

AD-A200 065

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OTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A200 059 20/3

ARKANSAS UNIV FAYETTEVILLE DEPT OF ELECTRICAL
ENGINEERING

(U) Adaptive Hybrid Picture Coding.

DESCRIPTIVE NOTE: Final rept. 30 Sep 84-30 Sep 88,

JUL 88

PERSONAL AUTHORS: Cook, Mark K.

CONTRACT NO. AFOSR-84-0322

PROJECT NO. 2305

TASK NO. 83

MONITOR: AFOSR
TR-88-1011

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Doctoral thesis.

ABSTRACT: (U) A novel approach to quantize design through the employment of estimation theory techniques leads to a solution to the problem of quantizing noise corrupted sources. By viewing the quantizer as a general estimation device, a risk function can be defined for predetermined cost functions and minimized to realize a quantizer structure which counteracts the effects of the additive noise. Keywords: Theses; Minimize technique; Quantum electronics. (Jhc)

DESCRIPTORS: (U) *NOISE(ELECTRICAL AND ELECTROMAGNETIC), *QUANTUM ELECTRONICS, ADAPTIVE SYSTEMS, CODING, COSTS, ESTIMATES, FUNCTIONS, HYBRID SYSTEMS, RISK, THESES.

IDENTIFIERS: (U) PE81102F, WUAFOSR230583, Additive noise, Risk functions, Cost functions, Minimize technique.

AD-A200 059

AD-A200 034 6/11 6/15 12/2

GEORGIA UNIV ATHENS DEPT OF PHARMACOLOGY AND TOXICOLOGY

(U) Validation and Application of Pharmacokinetic Models for Interspecies Extrapolations in Toxicity Risk Assessments of Volatile Organics.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 87-30 Jun 88,

AUG 88 118P

PERSONAL AUTHORS: Dallas, Cham E.; Bruckner, James V.; Gallo, James; Raghupathy, Ramanathan; Srinivasa, Muralidhara

CONTRACT NO. AFOSR-87-0248

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-88-1013

UNCLASSIFIED REPORT

ABSTRACT: (U) In pursuit of the goal of establishing a scientific basis for the interspecies extrapolation of pharmacokinetic data in health risk assessments, a series of studies have been conducted involving pharmacokinetic determinations in rats (to be followed later in dogs) to several aliphatic halocarbons. Direct measurements of the uptake and elimination of halocarbon in the blood and exhaled breath of rats have been completed during and following inhalation exposures to trichloroethylene (TCE), trichloroethane (TRI), and dichloroethylene (DCE). Two manuscripts have been completed for publication in peer-reviewed journals on the work with inhaled TCE and TRI. Pharmacokinetic determinations have also been made in studies of the ingestion of TCE, TRI, and DCE. Keywords: Physiologically-based pharmacokinetic model, Saturable metabolism, Respiratory elimination, Halocarbon inhalation exposure, Halocarbon oral exposure, Interspecies extrapolations, Pharmacokinetics, 1,1,1-Trichloroethane, 1,1-Dichloroethylene. (JES)

DESCRIPTORS: (U) *CHLORINATED HYDROCARBONS, *TOXICITY, *MODEL THEORY, *CHLOROETHANES, *ETHYLENE, *PHARMACOKINETICS, ALIPHATIC COMPOUNDS, BLOOD, DOGS,

AD-A200 034

UNCLASSIFIED

PAGE 75

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 034 CONTINUED

ELIMINATION, EXPERIMENTAL DATA, EXPOSURE(GENERAL),
EXTRAPOLATION, HALOGENATED HYDROCARBONS, HEALTH,
INGESTION(ENGINES), INHALATION, MEASUREMENT, METABOLISM,
MODELS, ORAL INTAKE, ORGANIC MATERIALS, RATS, RESPIRATORY
SYSTEM, RISK, SATURATION, TEST AND EVALUATION, TOXICITY,
VALIDATION, VOLATILITY.

IDENTIFIERS: (U) PE61102F, WJAFOSR2312A5.

AD-A200 008 8/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
PSYCHOLOGY

(U) Eye Movements and Visual Information Processing.

DESCRIPTIVE NOTE: Final progress rept. Jan 85-Mar 88.

AUG 88 7P

PERSONAL AUTHORS: Kowler, Eileen

CONTRACT NO. AFOSR-85-0022

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-88-1139

UNCLASSIFIED REPORT

ABSTRACT: (U) Eye movements are needed to acquire visual information because clear vision is available only at the center of the retina. The main objectives of the research are to understand that cognitive and sensory factors underlying the control of eye movements, and to understand how visual processing depends on the eye movements used to inspect displays. Experiments were completed shows that: (1) smooth pursuit becomes poor when the frequency of target motion exceeds 0.5 Hz even when the amplitude of motion is small (<30') so that average target velocity is low (Martins et al., 1985f); (2) the acquisition of information from visual displays is not limited by the directional pattern of saccades but is limited by size: small (<30') saccades, required to inspect small details not forming recognizable visual patterns, cannot be controlled accurately without latencies of several hundred milliseconds (Kowler and Anton, 1987). (JES)

DESCRIPTORS: (U) *EYE MOVEMENTS, *SENSES(PHYSIOLOGY), ACQUISITION, AMPLITUDE, COGNITION, CONTROL, DISPLAY SYSTEMS, FREQUENCY, IMAGE PROCESSING, INFORMATION PROCESSING, MOTION, MOVING TARGETS, OPTICAL IMAGES, PATTERNS, RETINA, SIZES(DIMENSIONS), TARGETS, VELOCITY, VISION, VISUAL AIDS, VISUAL PERCEPTION, VISUAL SIGNALS.

AD-A200 034

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UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 008 CONTINUED

AD-A200 005 20/9

IDENTIFIERS: (U) PE81102F, WUAFOSR2313A5.

CALIFORNIA UNIV LOS ANGELES DEPT OF PHYSICS

(U) Experimental Study of Plasmoid Formation and Transport
by Means of Moving Magnetic Fields.

DESCRIPTIVE NOTE: Final technical rept. 16 Sep 88-15 Dec
87,

FEB 88 19P

PERSONAL AUTHORS: Kuthi, Andras; Zwi, Helio; Hong, Alfred
Y.

CONTRACT NO. F49620-88-C-0107

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-88-1082

UNCLASSIFIED REPORT

ABSTRACT: (U) Driven, steady-state, stable plasmoids have been generated in an external axial magnetic field by rotating magnetic fields. The plasma equilibrium was stable for any value of beta between zero and unity. The plasmoid was free-standing, well removed from the RF antenna and the limiters. Limits to plasmoid stability have been investigated, and it was found that the antenna near-fields can effectively stabilize gross Magnetohydrodynamic modes through the RF ponderomotive force when the rotating field strength was higher than the value necessary for full field penetration. Decay of the driven diamagnetic current and thus the plasmoid has been investigated and it was found, that the resistive current decay was responsible for an induced azimuthal electric field producing the rapid, ion inertia limited $E \times B$ radial expansion. Keywords: Plasmoid; Stability; Equilibrium; Rotating fields. (JHD)

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *PLASMAS(PHYSICS), *MAGNETIC FIELDS, *RADIOFREQUENCY GENERATORS, *TRANSPORT PROPERTIES, ANTENNAS, AZIMUTH, DECAY, DIAMAGNETISM, ELECTRIC FIELDS, EQUILIBRIUM(GENERAL), EXTERNAL, FIELD INTENSITY, MOTION, PENETRATION, PLASMAS(PHYSICS), ROTATION, LIMITERS.

AD-A200 008

AD-A200 005

UNCLASSIFIED

PAGE 77

E/JUL F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A200 005 CONTINUED

AD-A199 999 8/7 20/11

IDENTIFIERS: (U) PE61102F, WJAFOSR2301A7, Plasmoids.

MASSACHUSETTS UNIV AMHERST DEPT OF CIVIL ENGINEERING

(U) Deformation Behavior of Sands under Cyclic Loading - A
Micro-Structural Approach.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Aug 88.

SEP 88 83P

PERSONAL AUTHORS: Chang, Ching S.

CONTRACT NO. AFOSR-88-0151

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-88-0982

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objective of this research is to develop a constitutive model for granular materials accounting for its micro-structure. The project focussed on the theoretical development of stress-strain relationship from a micro-mechanics approach, the law governing the force-displacement behavior at a contact under a general cyclic loading condition, and the mathematical characterization of the packing structure in the form of fabric tensor of a granular assembly. Experimental tests were conducted on rod assemblies in a directional shear box to verify the developed theory. Analytical expressions were obtained for the stiffness constants of anisotropic granular assemblies. Keywords: Granular mechanics; Constitutive law; Packing structure; Soil fabric; Random packings; Soil moduli; Structural anisotropy. (JES)

DESCRIPTORS: (U) *SAND, *GEOLOGY, ACCOUNTING, BEHAVIOR, BOXES, CONSTANTS, CYCLES, DEFORMATION, DIRECTIONAL, DISPLACEMENT, EXPERIMENTAL DESIGN, FABRICS, FORCE(MECHANICS), GRANULES, LOADS(FORCES), MATHEMATICAL ANALYSIS, MECHANICS, MICROSTRUCTURE, PACKAGING, RODS, SHEAR PROPERTIES, SOILS, STIFFNESS, STRESS STRAIN RELATIONS, TENSORS, TEST METHODS.

IDENTIFIERS: (U) PE61102F, WJAFOSR2302C1, *CYCLING

AD-A199 999

AD-A200 005

UNCLASSIFIED

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

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AD-A199 998 9/5

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES SIGNAL AND
IMAGE PROCESSING INS T

(U) Research in Optical Symbolic Computing Tasks.

DESCRIPTIVE NOTE: Annual progress rept. 1 Jun 87-31 May
88,

MAY 88 68P

PERSONAL AUTHORS: Jenkins, B. K.

CONTRACT NO. AFOSR-88-0198

PROJECT NO. 2305

TASK NO. 81

MONITOR: AFOSR
TR-88-0899

UNCLASSIFIED REPORT

ABSTRACT: (U) This report concentrated on the following topics: complexity studies for optical neural and digital systems and learning algorithms for neural networks. Several conference and journal papers reporting the research findings have been published. A list of publications and presentations is given at the end of the report along with a set of reprints and preprints. Connectivity and hierarchical neural networks, Digital optical parallel system complexity, Potential difference learning, Stochastic learning networks for computer vision. (KR)

DESCRIPTORS: (U) *COMPUTATIONS, *OPTICAL PROCESSING, ALGORITHMS, COMPUTERS, DIGITAL SYSTEMS, HIERARCHIES, LEARNING, NERVOUS SYSTEM, NETWORKS, NEURAL NETS, OPTICAL EQUIPMENT, REPRINTS, STOCHASTIC PROCESSES, SYMBOLS, VISION.

IDENTIFIERS: (U) PE81102F, WUAFOSR230581, *Optical symbolic computing.

AD-A199 999

AD-A199 998

UNCLASSIFIED

PAGE 79

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 995 19/9 8/10

AD-A199 985 CONTINUED

COLORADO STATE UNIV FORT COLLINS DEPT OF CIVIL
ENGINEERING

INDUCED ENVIRONMENTS, LABORATORY TESTS, LIQUEFACTION,
MATERIALS, MODELS, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS,
SAND, SATURATION, SCALING FACTORS, SKELETON, SOILS,
STRAIN(MECHANICS), TWO PHASE FLOW.

(U) Blast Induced Liquefaction of Soils: Laboratory and
Field Tests.

IDENTIFIERS: (U) PE81VO2F, WUAFOSR2302C1.

DESCRIPTIVE NOTE: Final rept. 1985-1988.

JUN 88 198P

PERSONAL AUTHORS: Charlie, Wayne A.

CONTRACT NO. AFOSR-85-0172

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-88-0990

UNCLASSIFIED REPORT

ABSTRACT: (U) Our field, laboratory and theoretical research indicate that the destruction potential of an explosion may be greatly magnified if detonated in water saturated granular soils. While blast-induced liquefaction may not necessarily damage a facility structurally, it may render it unusable. Empirical models are given that can be used to estimate liquefaction potential as a function of density, effective stress and applied compressive strain. One of the models uses an empirical scaling law for explosive loadings to predict the extent of porewater pressure increase in the field from buried, contained charges in saturated soils. A numerical analysis that considers the saturated soil as a two-phase medium is presented. The analysis accounts for the nonlinear, inelastic behavior of the soil skeleton and has shown that liquefaction is dependent upon the constrained modulus of the soil skeleton. Keywords: Liquefaction; Porewater Pressure; Dynamic testing; Blast loading; Soil mechanics; Laboratory testing; Field testing; Material modeling; Explosive loading; Saturated sand. (JES)

DESCRIPTORS: (U) *BLAST LOADS, *SOIL MECHANICS, BEHAVIOR,
BLAST, COMPRESSIVE PROPERTIES, DESTRUCTION, DYNAMIC TESTS,
ELASTIC PROPERTIES, EXPLOSIONS, EXPLOSIVES, FIELD TESTS.

AD-A199 995

AD-A199 995

UNCLASSIFIED

PAGE

80

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 994 CONTINUED

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Theoretical Studies of Kinetic Mechanisms of Negative Ion Formation in Plasmas.

DESCRIPTIVE NOTE: Final rept. 1 Jun 85-31 May 88,

JUN 88 54P

PERSONAL AUTHORS: Michels, H. H.

REPORT NO. UTRC/R88-927258

CONTRACT NO. F49620-85-C-0095

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-88-0980

UNCLASSIFIED REPORT

ABSTRACT: (U) This technical program constitutes a theoretical research investigation of the kinetic mechanisms of negative ion formation in plasmas. This study was directed toward elucidating the mechanisms of the most important volume dependent reactions that occur in hydrogen-ion, H-(D-) source devices, primarily of the Belchenko-Dimov-Dudnikov (BDD) type and toward evaluating other light negative anions, such as Li⁻, as possible sources. A primary goal of this research program was to identify the most important reactions leading to negative ion production or destruction and to estimate these reaction cross sections and product branching ratios. A further goal was to explore new chemical sources for the production of light mass negative atomic ions. The results of this program furnish data and provide a direction for more detailed investigations into the kinetics of both gas phase and gas-surface reaction rates of importance in ion source devices and provide input for reliable modeling of such systems. This investigation was carried out using quantum mechanical methods. Both ab initio and density functional approaches were employed in these studies. Keywords: Potential energy surfaces, Negative ions, Dissociation attachment, Ion molecule reactions, Hydrogen, Lithium. (MUM)

DESCRIPTORS: (U) *ANIONS, *GAS SURFACE INTERACTIONS, *HYDROGEN, *ION ION INTERACTIONS, *LITHIUM, ATTACHMENT, CHEMICALS, CROSS SECTIONS, DENSITY, DISSOCIATION, ION SOURCES, IONIZATION, KINETICS, LIGHT, MECHANICS, MODELS, MOLECULES, POTENTIAL ENERGY, PRODUCTION, QUANTUM THEORY, RATES, RELIABILITY, RESPONSE, SOURCES, SURFACES, THEORY, VAPOR PHASES, VOLUME.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2301A7.

AD-A199 994

AD-A199 994

UNCLASSIFIED

PAGE 81

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 993 CONTINUED

AD-A199 993 12/8 8/5

CITY COLL NEW YORK DEPT OF ELECTRICAL ENGINEERING

(U) Optical Acquisition, Image and Data Compression.

DESCRIPTIVE NOTE: Final rept. Jun 87-Jul 88.

JUL 88 100P

PERSONAL AUTHORS: Eichmann, George

REPORT NO. CCEE-447222-3

CONTRACT NO. AFOSR-85-0212

PROJECT NO. 2305

TASK NO. 81

MONITOR: AFOSR
YR-88-0988

UNCLASSIFIED REPORT

ABSTRACT: (U) A new conditional symbolic substitution rule for modified signed-digit arithmetic computation is introduced. Using this substitution rule, the numbers to be added or subtracted are first replaced by a pair of new equivalent strings, which in a second step are then subject to another substitution to generate both the addition or substitution result and its complement. For an optical implementation, a holographic content-addressable memory is used. Correspondingly, the input encoding, the logic reduction, and the optical processing techniques are described. An optical isochronous array processing method is proposed. An optical isochronous array processor (OIAP) is a local regularly interconnected processing network that employs an array of identical processing elements. In an OIAP, incoming, isochronous data are parallel processed in a fashion much like a propagating electromagnetic wavefront. For the various applications, the OIAP processing elements and their interconnections can be different. In this paper, various all-optical OIAP elements are considered. Applications ranging from optical binary number multiplication preprocessing to optical matrix algebra as well as to optical residue arithmetic are presented. (KR)

DESCRIPTORS: (U) *DATA ACQUISITION, *DATA COMPRESSION,

AD-A199 993

AD-A199 993

*OPTICAL PROCESSING, *OPTICAL IMAGES, *PARALLEL PROCESSING, *PARALLEL PROCESSORS, ALGEBRA, CIRCUIT INTERCONNECTIONS, CODING, ELECTROMAGNETIC WAVE PROPAGATION, INPUT, LOGIC, MATRICES (MATHEMATICS), METHODOLOGY, NETWORKS, REDUCTION, SUBSTITUTES.

IDENTIFIERS: (U) PE81102F, WJAF0SR2305B1, OIAP (Optical Isochronous Array Processor).

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A199 992 14/2 7/4

AD-A199 991 14/2 12/8

STANFORD UNIV CA DEPT OF APPLIED PHYSICS

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Tunable Solid State Lasers and Synthetic Nonlinear Materials.

(U) Spectroscopic and Light Scattering Instrumentation Proposal.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 88-31 Jul 87.

DESCRIPTIVE NOTE: Final rept. 1 Jan 85-31 Dec 87.

SEP 87 47P

DEC 87 5P

PERSONAL AUTHORS: Byer, Robert L.

PERSONAL AUTHORS: Ross, John; Schell, Mark A.; Irvin, Benjamin

CONTRACT NO. AFOSR-88-0275

CONTRACT NO. AFOSR-85-0098

PROJECT NO. 2917

PROJECT NO. 2917

TASK NO. A8

TASK NO. A2

MONITOR: AFOSR
TR-88-0891MONITOR: AFOSR
TR-88-1085

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Instrumentation Grant AFOSR-88-0275, an award of \$342,308 for the time period 8/1/88 to 7/31/87. The report contains five (5) sections: I) a list of equipment proposed and purchased under the grant, II) a discussion of exceptions to the original equipment list, III) a summary of research projects on which the equipment has been used, IV) a synopsis of the ongoing research activities of the Byer group, and V) a summary. Keywords: Spectrometer System; Mass spectrometers; Automated microscopy system; Optical equipment; Superconductors. (MGM)

ABSTRACT: (U) The equipment purchased on this grant falls into three categories: The first consists of components for four apparatus systems used for the study of oscillatory reactions and the effects of external periodic perturbations on such reactions. The second category includes generally used instrumentation including a storage oscilloscope, a visible spectrometer a thermostat bath, an analytical balance, a ph meter and strip chart recorder. The third category is computers and components including upgrading for laboratory computers on hand, computer networking hardware, computer data acquisition elements (both hardware and software) used in all the experiments as well as theoretical work; associated with the experiments. (MGM)

DESCRIPTORS: (U) *MASS SPECTROMETERS, *NONLINEAR SYSTEMS, *OPTICAL EQUIPMENT, *SOLID STATE LASERS, *TUNABLE LASERS, AUTOMATION, MICROSCOPY, SPECTROMETERS, SUPERCONDUCTORS, SYNTHETIC MATERIALS.

DESCRIPTORS: (U) *COMPUTERS, *MEASURING INSTRUMENTS, *SPECTROMETERS, BALANCE, BATHS, CHARTS, COMPUTER PROGRAMS, DATA ACQUISITION, EXTERNAL, LABORATORIES, OSCILLATION, OSCILLOSCOPES, PERTURBATIONS, PH FACTOR, RECORDING SYSTEMS, STORAGE, THEORY, THERMOSTATS, VISIBLE SPECTRA.

IDENTIFIERS: (U) PE81102F, WUAFOSR2917A8.

IDENTIFIERS: (U) PE81102F, WUAFOSR2917A2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 990

7/4

PRINCETON UNIV NJ

(U) The Physics of Spin Polarized Atomic Vapors.

DESCRIPTIVE NOTE: Final Technical rept. 1 Oct 88-30 Apr 88.

MAY 88 4P

PERSONAL AUTHORS: Happer, William

CONTRACT NO. AFDSR-85-0171

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-88-1078

UNCLASSIFIED REPORT

ABSTRACT: (U) Our research efforts were focussed on the study of spin polarized atoms, nuclei and electrons during the period covered by this report. Although this work is 6.1 basic research, it has applications to a number of important Air Force problems. For example, the atomic clocks used on the GPS satellite system operate with optically pumped rubidium absorption cells, very similar to the ones being investigated in our laboratory. A number of the scientists and engineers working on atomic clocks used by Air Force satellite systems were trained with the support of this grant. We have participated in recent Air Force advisory panels to review concepts for high-energy-density fuels based on spin polarized atoms and molecules. The insights we have gained from research sponsored by this grant have been very useful to us in evaluating these ideas. Our recent work has focussed on two main areas, the investigation of quadrupolar interactions between spin polarized noble gas nuclei and surfaces and the quantitative investigation of how magnetic field inhomogeneities cause spin relaxation. (MUM)

DESCRIPTORS: (U) *ATOMS, *ELECTRONS, *NUCLEI, *POLARIZATION, *RELAXATION, *SPIN STATES, *RARE GASES, ADVISORY ACTIVITIES, AIR FORCE, ARTIFICIAL SATELLITES, ATOMIC CLOCKS, ENGINEERS, FUELS, HETEROGENEITY, HIGH

AD-A199 990

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 989 20/4

AD-A199 989 CONTINUED

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF
AEROSPACE ENGINEERING

(U) Studies of Unsteadiness in Boundary Layers.
*UNSTEADY FLOW, BLUNT BODIES, CONTROL SURFACES, ENERGY,
EXPERIMENTAL DATA, FLOW SEPARATION, LAYERS, ONE
DIMENSIONAL, OSCILLATION, PRODUCTION, SHEAR PROPERTIES,
TURBULENCE, TURBULENT BOUNDARY LAYER, TURBULENT FLOW,
WAKE.

DESCRIPTIVE NOTE: Annual technical rept. 1 May 87-30 Apr
88,

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2, Chaos.

JUL 88 18P

PERSONAL AUTHORS: Blackwelder, Ron F.; Ho, Chih-Ming;
Huerre, Patrick; Redekopp, Larry G.

CONTRACT NO. F49620-85-C-0080

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-88-1138

UNCLASSIFIED REPORT

ABSTRACT: (U) Experimental and theoretical efforts aimed
at clarifying and revealing important dynamical features
of several turbulent shear flows are described. The flows
studied include boundary layers, jets, wakes and
separated flows on lifting surfaces. Significant progress
has been made through experimental studies toward
understanding: 1) Unsteady, near wall processes in
turbulent boundary layers responsible for the production
of turbulent energy; 2) Procedures for enhancing
entrainment and mixing in hot jets by passively
contouring the jet exit; and 3) Characteristics of
boundary layer separation and its control on lifting
surfaces in unsteady flows. Theoretical studies on the
temporal and spatial structure in blunt body wakes have
revealed the necessary conditions under which global,
self sustained oscillations appear and have provided firm
criteria for specifying the frequency of these
oscillations. The theory has been employed to describe
the preferred mode in jets. In addition, A Theory
description of the appearance of the spatial chaos in
wake shear layers, and its representation in terms of a
one dimensional map, has been provided. (jnd)

DESCRIPTORS: (U) *BOUNDARY LAYER FLOW, *LIFTING SURFACES,

AD-A199 989

AD-A199 989

UNCLASSIFIED

PAGE 85

EVJ00F

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AD-A199 988 12/4 20/C 9/5 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 988 CONTINUED

CLARKSON UNIV POTSDAM NY DIV OF RESEARCH

(U) Collective Properties of Neural Systems and Their Relation to Other Physical Models.

DESCRIPTIVE NOTE: Final rept. 1 Jul 87-31 Aug 88,

AUG 88 171P

PERSONAL AUTHORS: Barouch, Eytan; Fokas, A. S.

REPORT NO. 3

CONTRACT NO. AFOSR-87-0310

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-88-1014

UNCLASSIFIED REPORT

ABSTRACT: (U) During the tenure of this contract progress was accomplished on three fronts: 1) The recursion operator of the Landau-Lifshitz equation has been completed explicitly. This has been achieved algorithmically by utilizing methods introduced earlier. It should be emphasized that in addition to the important implications of these results to general lattice theories and neural networks, the answers obtained are novel on their own merit since textbooks referred to constructing the above recursion operation as an outstanding open problem. 2) We have continued our study of nonlinear optics. We have introduced a new system of nonlinear PDE's that governs the development path of photorealist fabrication. We have employed a proof given in collaboration with Araki concerning an iteration scheme, used throughout the analysis. We have reported this work in various publications and in a number of international conferences. 3) Substantial progress has been made towards solving the nonlinear Schrodinger (NLS) equation on the half-time. Finite boundedness in conjunction with nonlinear evolution equations have alluded investigators for years. Since nonlinear optics is to be employed on finite boundaries, a major thrust was needed to achieve viable results. A new method has been introduced and

tested on the NLS on the half-line. For the first time concrete analytical results have been obtained, and the entire problem has been reduced to linearizing a certain equation satisfied by the scattering data. This linearization and the application of the above method to other important evolution equations is under investigation. (KR)

DESCRIPTORS: (U) *NEURAL NETS, *OPTICS, BOUNDARIES, NONLINEAR DIFFERENTIAL EQUATIONS, EVOLUTION(GENERAL), FABRICATION, INTERNATIONAL, ITERATIONS, LINEARITY, MODELS, NERVOUS SYSTEM, PARTIAL DIFFERENTIAL EQUATIONS, PHYSICAL OPERATORS(MATHEMATICS), PATHS, PHOTORESISTORS, PHYSICAL PROPERTIES, RECURSIVE FUNCTIONS, SCATTERING, SYMPOSIA, TEXTBOOKS, VIABILITY.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A4.

AD-A199 988

AD-A199 988

UNCLASSIFIED

PAGE 86

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 962 20/4

AD-A199 962 CONTINUED

TENNESSEE UNIV SPACE INSY TULLAHOMA GASDYNAMICS DIV

SURFACE PROPERTIES, WATER TUNNELS, WIND TUNNEL TESTS,
WINGS.

(U) Investigation of Phenomena of Discrete Wingtip Jets.

IDENTIFIERS: (U) PE81102F, WUAFOSR2307A1.

DESCRIPTIVE NOTE: Final technical rept. May 88-Aug 88,

AUG 88 80P

PERSONAL AUTHORS: Wu, J. W.; Vakili, A. D.; Shi, Z.; Mo,
J. D.

REPORT NO. UTSI-88-06

CONTRACT NO. AFOSR-86-0155

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-88-0937

UNCLASSIFIED REPORT

ABSTRACT: (U) Detail flow phenomena of discrete wingtip jets blowing from a rectangular wing with squared edges and round tips are investigated in the water-and wind-tunnel experiments. Phenomena on a single asymmetric jet blowing from a flat-plate in crossflow were incorporated into the present wingtip jet study. The local flow field perturbation introduced by the tip jet blowing closely resembles that of the asymmetric jet from the flat-plate. The wingtip jet has influenced the global surface pressure distribution over the wing and improved the lift loading. A simple mathematical model is developed for practical calculation of wing loading. Keywords: Wing performance; Lift augmentation; Discrete jets, Wingtip jet blowing; Asymmetric jet; Jet in crossflow; Tip blowing; Vortex control; Jet vortices; Flow visualizations; Jet application; Wingtip vortex wake; Tip vortex dispersion; Water tunnel tests; Wind tunnel tests. (jhd)

DESCRIPTORS: (U) *TRAILING VORTICES, *WAKE, *WING TIPS, AUGMENTATION, COMPUTATIONS, CONTROL, DISPERSING, AERODYNAMIC LOADING, FLOW FIELDS, FLOW VISUALIZATION, GLOBAL, AERODYNAMIC LIFT, MATHEMATICAL MODELS, PERTURBATIONS, PRESSURE DISTRIBUTION, RECTANGULAR BODIES,

AD-A199 962

AD-A199 962

UNCLASSIFIED

PAGE 37

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 961 CONTINUED

AD-A199 961 21/2

GENERAL ELECTRIC CO SCHENECTADY N Y RESEARCH AND
DEVELOPMENT CENTER

(U) Carbon Monoxide and Turbulence-Chemistry Interactions:
Blowoff and Extinction of Turbulent Jet Diffusion
Flames.

DESCRIPTIVE NOTE: Final rept. 1 May 85-1 Jun 88.

AUG 88 78P

PERSONAL AUTHORS: Correa, S. W.

REPORT NO. 88SRD012

CONTRACT NO. F49620-85-C-0035

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0935

UNCLASSIFIED REPORT

ABSTRACT: (U) Turbulence chemistry interactions have been studied experimentally and theoretically in the context of turbulent diffusion flames. The goal is a quantitative understanding of these interactions under a wide range of conditions. These range from low Reynolds number conditions ('weak' interactions, affecting primarily the levels of intermediate species, pollutants and combustion efficiency) to high Reynolds number conditions, where the flames can be extinguished by intense turbulent straining. Jet flames in coflowing air have been emphasized, with a conannular pilot burner used where necessary for stabilization at the burner lip. Fuels have consisted of carbon dioxide/H₂ mixtures with the fraction of hydrogen successively reduced to promote extinction. Reynolds numbers have been increased to the point of blowoff. Major species and temperature have been measured by Raman scattering, and velocity and turbulence have been measured by laser velocimetry. These experiments have provided a comprehensive set of data on CO/H₂ flames, extending to conditions conducive to localized extinction. The data show significant temperature decrements due to finite-rate chemistry but

AD-A199 961

AD-A199 961

UNCLASSIFIED

PAGE 88

EVJ00F

no evidence of localized extinction. Keywords: Turbulence, Chemistry interactions, Extinction, Turbulent diffusion, flames, Superequilibrium, Laser diagnostics. (MJM)

DESCRIPTORS: (U) *BLOWOFF, *COMBUSTION, *DIFFUSION, *JET FLAMES, *TURBULENCE, CARBON MONOXIDE, DEGRADATION, DIAGNOSIS(GENERAL), EFFICIENCY, EXTINGUISHING, FLAMES, FLUORINE COMPOUNDS, FUELS, HIGH RATE, INTERACTIONS, LASER APPLICATIONS, LASER VELOCIMETERS, LIGHT SCATTERING, LOW RATE, LOW STRENGTH, NITRILES, PHOSPHINE, POLLUTANTS, RAMAN SPECTRA, RANGE(EXTREMES), REYNOLDS NUMBER, TEMPERATURE, CARBON DIOXIDE, HYDROGEN.

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A199 959 11/2

AD-A199 958 11/8.1 11/8.2

BABCOCK AND WILCOX CO LYNCHBURG VA

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) A New Process for Final Densification of Ceramics.

(U) Dispersion Strengthening of High Temperature Niobium Alloys.

DESCRIPTIVE NOTE: Final rept. 15 Feb 85-14 May 88.

DESCRIPTIVE NOTE: Annual rept. May 87-May 88.

MAY 88 87P

MAY 88 48P

PERSONAL AUTHORS: Wagner, R. A.

PERSONAL AUTHORS: Anton, D. L.; Snow, D. B.; Glamei, A. F.

CONTRACT NO. F49620-85-C-0053, ARPA Order-5172

REPORT NO. UTRC/R88-917437-2

PROJECT NO. 2303

CONTRACT NO. F49620-86-C-0053

TASK NO. A3

PROJECT NO. 2308

MONITOR: AFOSR

TASK NO. A1

TR-88-1008

UNCLASSIFIED REPORT

MONITOR: AFOSR
TR-88-0979

ABSTRACT: (U) The objective of this program was to demonstrate the feasibility of novel densification process based on supercritical fluids. Using this process carbon/carbon composites were impregnated with silicon carbide precursors and pyrolyzed to produce oxidation resistant pore coatings. The resulting samples were characterized in terms of silicon distribution, mechanical properties, and oxidation resistance. The solubility behavior of candidate carbon and silicon carbide precursors was determined in supercritical propane and carbon dioxide. In addition, two silicon carbide precursors were fractionated and characterized to establish the molecular weight dependence of the char yield. The results of the solubility and fractionation studies were then used to guide the impregnation program. (JES)

DESCRIPTORS: (U) *CERAMIC MATERIALS, BEHAVIOR, CARBON, CARBON CARBON COMPOSITES, CARBON DIOXIDE, CHARRING, DENSITY, DISTRIBUTION, FLUIDS, FRACTIONATION, IMPREGNATION, MECHANICAL PROPERTIES, MOLECULAR WEIGHT, OXIDATION RESISTANCE, PRECURSORS, PROPANE, SILICON, SILICON CARBIDES, SOLUBILITY, SUPERCRITICAL FLOW, YIELD.

IDENTIFIERS: (U) PB81102F, WJAFOSR2303A3.

AD-A199 959

UNCLASSIFIED

PAGE 89

EVJ00F

UNCLASSIFIED REPORT

ABSTRACT: (U) Niobium base alloys are very attractive as high temperature materials for advanced gas turbine applications. After many conventional metallurgical approaches, a high temperature creep resistant alloy has yet to be identified which will replace nickel base superalloys. The best chance for obtaining high temperature creep resistance in these alloys is through dispersion strengthening with a stable precipitate that is introduced through rapid solidification. This would result in a very fine dispersion of non-shearable precipitates that would not coarsen upon long term exposure at temperatures in excess of 1200 C. A study has been conducted here to identify such a stable dispersion, fabricate alloys through a rapid solidification approach and characterize the coarsening of the resulting precipitates. A thermodynamic argument is presented to select candidate dispersions for evaluation. Keywords: Niobium, Dispersion strengthening, High temperature strength, Creep particle coarsening, Refractory metals. (JES)

DESCRIPTORS: (U) *DISPERSION HARDENING, *NIOBIUM, *STRENGTH(MECHANICS), ALLOYS, CREEP, CREEP STRENGTH, DISPERSIONS, EXPOSURE(GENERAL), GAS TURBINES, HEAT

AD-A199 958

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 958 CONTINUED

AD-A199 955 7/2

RESISTANT ALLOYS, HIGH STRENGTH, HIGH TEMPERATURE, MATERIALS, METALLURGY, NICKEL ALLOYS, NIOBIUM ALLOYS, PARTICLES, PRECIPITATES, QUICK REACTION, REFRACTORY METALS, SOLIDIFICATION, STABILITY, SUPERALLOYS, TEMPERATURE, THERMODYNAMICS.

SRI INTERNATIONAL MENLO PARK CA

(U) Two Photon Detection Techniques for Atomic Fluorine.

DESCRIPTIVE NOTE: Final rept. 1 Jan 85-1 Apr 88.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A1, Rapid solidification.

JUN 88 49P

PERSONAL AUTHORS: Bischel, William K.

CONTRACT NO. F49620-85-K-0005

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-87-0988

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes research to develop a sensitive technique for the remote detection of atomic fluorine based on two-photon excitation of high lying atomic states, followed by fluorescence. We report the first demonstration of two-photon excited laser induced fluorescence in F using a pump laser of 180 nm. In addition, we have also observed 3+2 resonantly-enhanced multiphoton ionization (REMPI) of F at 285 nm, and 3+1 REMPI of F at 233 nm. No fluorescence was observed for the three-photon excitation processes. We recommend directions for future research quantify this F-atom detection technique. Keywords: Multiphoton ionization spectroscopy, Atomic fluorine. (MUM)

DESCRIPTORS: (U) *DETECTION, *FLUORINE, ATOMIC ENERGY LEVELS, ATOMS, DEMONSTRATIONS, EXCITATION, FLUORESCENCE, METHODOLOGY, PHOTOIONIZATION, PHOTONS, REMOTE DETECTORS, SENSITIVITY, SPECTROSCOPY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A3, LPN-SRI-8320.

AD-A199 958

AD-A199 955

UNCLASSIFIED

PAGE 80

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 949 20/4 4/1

AD-A199 949 CONTINUED

NORTHWEST RESEARCH ASSOCIATES INC BELLEVUE WA

(U) Studies of Internal Wave/Mean Flow Interactions.

IDENTIFIERS: (U) Breaking waves, Kelvin Helmholtz instability, Instability, PE81102F, WUAFOSR3005A1.

DESCRIPTIVE NOTE: Final rept. 1 Nov 86-30 Apr 88.

JUN 88

PERSONAL AUTHORS: Delisi, Donald P.

REPORT NO. NNRA-CR-88-R029

CONTRACT NO. F49620-86-C-0015

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-88-1003

UNCLASSIFIED REPORT

ABSTRACT: (U) A laboratory facility to observe internal gravity wave/mean flow interactions is described, and results from experiments are presented. The laboratory measurements include density measurements, instantaneous and mean velocity measurements, and shadowgraph observations. The results show that early wavebreaking in turbulent critical layers is characterized by Kelvin-Helmholtz instability and is not convective, as reported in earlier studies. The vertical location of the early over-turning moves progressively toward the gravity wave source and is correlated with observed mean flow modifications. Late-time gravity wave/critical layer interactions are characterized by steady-state mixing regions which are phase-locked to incoming gravity waves. Results from numerical simulations are also presented and are qualitatively similar to the early-time laboratory measurements. Keywords: Atmosphere models; Internal gravity waves; Mean flow; Shear interactions. (edc)

DESCRIPTORS: (U) *ATMOSPHERE MODELS, *GRAVITY WAVES, *INTERNAL WAVES, *TURBULENCE, DENSITY, FLOW, INTERACTIONS, LABORATORIES, LABORATORY PROCEDURES, LAYERS, MEAN, MEASUREMENT, MIXING, MODIFICATION, NUMERICAL ANALYSIS, SHEAR PROPERTIES, SOURCES, SPARK SHADOWGRAPH PHOTOGRAPHY, STEADY STATE, TIME, VELOCITY, VERTICAL ORIENTATION.

AD-A199 949

AD-A199 949

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 940 12/7

AD-A199 940 CONTINUED

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Approximate Evaluation of Reliability and Availability
Via Perturbation Analysis.

DESCRIPTIVE NOTE: Final Rept. Jun 84-Sep 87,

MAR 88 131P

PERSONAL AUTHORS: Walker, Bruce K.; Chu, Sin-Kwong;
Wereley, Norman M.

CONTRACT NO. AFOSR-84-0180

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0975

UNCLASSIFIED REPORT

ABSTRACT: (U) The progress on a three-year effort to examine approximate reliability evaluation techniques for fault tolerant control and sensor system is described. The motivation for the work is provided by the fact that the reliability models for these system tend to be finite state semi-Markov models with large dimension that evolve relatively slowly in time due to the rare occurrence rate of component failures. The transient behavior of these models is of interest because the steady state behavior is trivial and not of practical importance. The evaluation of the transient behavior of such models, however, is intractable even for relatively simple system architectures because of the widely varying rates at which events occur in the model. The research effort concentrates on generating useful limit theorems that approximate the behavior of these models asymptotically well as the small component failure rates become vanishingly small. Using the work of Korolyuk as a starting point, such limit theorems are generated for both continuous and discrete time models that are representative of fault tolerant system behavior. In particular, the limit theorems of Korolyuk are expanded to cover models where the classes of the decomposed models include trapping states when the small parameter vanishes and to cover models where the holding times are

not necessarily scaled by the small parameter. (kr)

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *FAULT TOLERANT COMPUTING, BEHAVIOR, CONTINUITY, CONTROL, DETECTORS, EXPANSION, FAILURE, MARKOV PROCESSES, MODELS, MOTIVATION, PARAMETERS, PERTURBATIONS, RATES, RELIABILITY, SIZES(DIMENSIONS), STEADY STATE, TEST AND EVALUATION, TIME, TRANSIENTS.

IDENTIFIERS: (U) WUAF0SRK2304AB, PEB1102F.

AD-A199 940

AD-A199 940

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A199 930 11/2 20/11

AD-A199 929 12/3

FLORIDA UNIV GAINESVILLE DEPT OF AEROSPACE ENGINEERING

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Strength and Deformation of Confined and Unconfined Concrete Under Axial Dynamic Loading.

(U) Degenerate Multivariate Stationary Processes: Basicity, Past and Future, and Autoregressive Representation.

DESCRIPTIVE NOTE: Final Rept. 15 May 87-14 Jul 88,

DESCRIPTIVE NOTE: Rept. for Sep 84-31 Aug 85,

AUG 88 73P

87 20P

PERSONAL AUTHORS: Malvern, Laurence E.; Jenkins, David A.

PERSONAL AUTHORS: Mianee, A. G.; Pourahmadi, Mohsen

CONTRACT NO. AFOSR-87-0201

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2302

PROJECT NO. 2304

TASK NO. C2

TASK NO. A8

MONITOR: AFOSR
TR-88-0958MONITOR: AFOSR
TR-88-0865

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes a research program whose specific objectives were to develop procedures and to demonstrate the feasibility of using them to make micrographic examinations of slices cut from damaged Split-Hopkinson-Pressure Bar unconfined concrete compression test specimens that were recovered intact and also from untested and statically tested specimens in order to determine crack development characteristics. The general objective was to obtain a qualitative understanding of the physical mechanism leading to failure and potentially a quantitative basis for deformation and failure process modeling. This specific investigation was preliminary for a more extensive study of both confined and unconfined test specimens. Keywords: Concrete, Dynamic loads, Dynamic properties, Dynamic testing, Fracture, Hopkinson bar. (JES)

DESCRIPTORS: (U) *CONCRETE, *STRESS ANALYSIS, AXES, COMPRESSION, CRACKS, DEFORMATION, DYNAMIC LOADS, DYNAMIC TESTS, DYNAMICS, FAILURE, LOAD DISTRIBUTION, MODELS, PHYSICAL PROPERTIES.

IDENTIFIERS: (U) WUAFOSR2302C2, PE81102F.

SUPPLEMENTARY NOTE: Pub. in Sankhya: The Indian Jnl. of Statistics, Series A, v49 pt3 p316-334 1987.

ABSTRACT: (U) This reprint lets (X sub n) be a not necessary full rank multivariate weakly stationary stochastic process. It is shown that (X sub n) forms a generalized Schauder basis for the time domain of the process if and only if the angle between its past-present and future subspaces is positive. Then validity of the autoregressive representation of (X sub n), and that of its predictor, is considered and some characterization for these representations are given. Under the additional assumption that the range of the spectral density f of a degenerate process (X sub n) is constant, some more concrete criteria for the validity of these representations are obtained. (kr)

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *STOCHASTIC PROCESSES, PREDICTIONS, REPRINTS, STATIONARY, STATISTICAL PROCESSES, TIME DOMAIN.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A8, Autoregressive representation.

AD-A199 930

AD-A199 929

UNCLASSIFIED

PAGE 93

EVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJOOF

AD-A199 928 7/2 7/5

AD-A199 928 CONTINUED

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

POTENTIAL ENERGY, PUMPING, TORQUE, TRANSITIONS.

(U) Energetics and Spin- and Lambda-Doublet Selectivity in the Infrared Multiphoton Dissociation $\text{HN}_3(\text{X } 1\text{A}')$ Yields $\text{N}_2(\text{X } 1\text{Sigma sub g}(+)) + \text{NH}(\text{X } 3\text{Sigma}(-)), \text{A } 1\text{Delta})$: Theory.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303B1.

AUG 88 15P

PERSONAL AUTHORS: Alexander, Willard H.; Werner, Hans-Joachim; Dagdigan, Paul J.

CONTRACT NO. F49620-88-C-0058

PROJECT NO. 2303

MONITOR: AFOSR
YR-88-0941

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v89 n3 p1388-1400, 1 Aug 88.

ABSTRACT: (U) An investigation of the energetics and mechanism of the dissociation of ground state $\text{HN}_3(\text{X } 1\text{A}')$ into ground state $\text{N}_2(\text{X } 1\text{Sigma g } +) + (\text{X } 3\text{Sigma } -)$ products is presented. This process, which can be induced by multiphoton infrared pumping, occurs through a crossing between the lowest energy singlet potential energy, which correlates asymptotically with electronically excited NH products ($\text{a } 1\text{delta}$), and the lowest triplet surface. By means of ab initio CASCF and MCSCF-CI calculations we have determined that the geometry at the minimum singlet-triplet crossing corresponds to an approximately linear N_3 backbone with a perpendicular NH bond. The interior N-N distance is approx. 3.6 bohr. This transition state lies approx. 12, 500/cm above the energy of the $\text{X } 1\text{A}'$ state of HN_3 at the experimental equilibrium geometry. Since the N-N and N-H bonds are perpendicular at this transition state, there will be no torques tending to twist the system out of a planar geometry. Keywords: Hydrazoic acid, Infrared multiphoton dissociation. (mgm)

DESCRIPTORS: (U) *PHOTODISSOCIATION, *HYDRAZOIC ACID, ENERGETIC PROPERTIES, EQUILIBRIUM(GENERAL), GEOMETRIC FORMS, INFRARED RADIATION, PHOTONS, PLANAR STRUCTURES,

AD-A199 928

UNCLASSIFIED

AD-A199 928

PAGE

94

EVJOOF

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 926 11/8.1 1/3

AD-A199 926 CONTINUED

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

(U) Processability and High Temperature Behavior of Emerging Aerospace Alloys.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 May 87-30 Apr 88,

AUG 88 41P

PERSONAL AUTHORS: Ghosh, A. K.; Rhodes, C. G.

REPORT NO. SC5459.AR

CONTRACT NO. F49620-86-C-0058

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-88-0970

UNCLASSIFIED REPORT

ABSTRACT: (U) Part I of this program examines a unified approach for understanding and assessing microstructure changes under the influence of different modes of thermomechanical and deformation processing. Experimental validation of the microstructure changes occurring in advanced aluminum alloys, such as SiC particulate reinforced aluminum, high strength P/W aluminum and high temperature aluminum alloy, Al-8Fe-4Ce, are being conducted. Progress of microstructural refinement and changes in misorientation between subgrains are determined to delineate the path for optimum processability for these alloys. The effects of various processing conditions on texture and elevated temperature deformation characteristics have been studied. Part II of the program is a study of the effects of Fe, C, O, and Si as minor additions and Nb and V as major additions of Ti-22Al-8Nb on 675 C creep behavior. The results have demonstrated that the effects of the individual additives on creep resistance for the Ti3Al base alloy are essentially the same as those previously observed for conventional titanium alloys. Si and Si + Zr are effective for improving creep resistance of the alpha-two alloys by pinning mobile dislocations during creep exposure. (JES)

AD-A199 926

AD-A199 926

DESCRIPTORS: (U) *AEROSPACE SYSTEMS, *ALLOYS, ADDITIVES, ALUMINUM, ALUMINUM ALLOYS, BEHAVIOR, CREEP, CREEP STRENGTH, DEFORMATION, DISLOCATIONS, EXPERIMENTAL DATA, EXPOSURE(GENERAL), HIGH TEMPERATURE, MICROSTRUCTURE, MOBILE, PARTICULATES, PROCESSING, REFINING, REINFORCING MATERIALS, TEXTURE, TITANIUM ALLOYS, VALIDATION.

IDENTIFIERS: (U) PE61102F, WJAFOSR2308A1.

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A199 923 5/8 5/7
HARVARD UNIV CAMBRIDGE MA

(U) Context Effects in Recognizing Syllable-Final /z/ and /s/ in Different Phrasal Positions.

DESCRIPTIVE NOTE: Annual rept. no. 1, 15 Jun 87-15 Jun 88,

SEP 88 37P

PERSONAL AUTHORS: Gordon, Peter C.

CONTRACT NO. AFOSR-87-0305

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-88-0936

UNCLASSIFIED REPORT

ABSTRACT: (U) Two experiments are reported that use gating methods to examine the role of non-semantic aspects of sentential context in the recognition of phonetic segments. Performance in recognizing syllable-final /s/ and /z/ improves when the syllables are presented to listeners in sentential context as compared to when they are presented in isolation. It appears that listeners are able to use sentential information in order to factor out prosodically based variations in the temporal characteristics of speech in order to more accurately interpret durational cues to segment identity. These findings extend previous results on rate-dependent processing of overall speaking rate to the processing of local speaking rate, and they provide further demonstration of the importance of extended phonetic context in speech recognition. Keywords: Speech perception psychology; human hearing performance. (edc)

DESCRIPTORS: (U) *PERCEPTION(PSYCHOLOGY), *PHONETICS, *SPEECH RECOGNITION, AUDITORY PERCEPTION, HEARING, ISOLATION, PERFORMANCE(HUMAN), RATES, SPEECH.

IDENTIFIERS: (U) Context effects, PE61102F, WJAFOSR2313A4.

AD-A199 923

UNCLASSIFIED

AD-A199 922 7/2 14/2

MARYLAND UNIV COLLEGE PARK DEPT OF PHYSICS AND ASTRONOMY

(U) Scanning Tunneling Microscopy as a Surface Chemical Probe.

DESCRIPTIVE NOTE: Final rept. 1 Dec 84-31 May 88,

MAY 88 20P

PERSONAL AUTHORS: Williams, Ellen D.

CONTRACT NO. AFOSR-85-0042

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-88-0868

UNCLASSIFIED REPORT

ABSTRACT: (U) The instrumentation needed for combining a new imaging technique, Scanning Tunneling Microscopy (STM), with standard surface analytical methods has been developed. The surface analytical capabilities of a new system have demonstrated by study of the Barium catalyzed oxidation of Nickel. The operation of the STM has been demonstrated by a detailed study of the imaging of the graphite surface. The changes in graphite imaging with tunneling voltage have been measured and compared with theoretical predictions of the effect of surface change density and surface deformation on imaging via STM. The combination of STM with the surface analytical probes has been demonstrated in a comparison of LEED and STM measurements of a stepped Si surface. It is shown that LEED is rather insensitive to structural changes that are readily apparent using STM. (mgm)

DESCRIPTORS: (U) *BARIUM, *MICROSCOPY, *NICKEL, DEFORMATION, DENSITY, GRAPHITE, IMAGES, OXIDATION, PREDICTIONS, PROBES, SCANNING, SENSITIVITY, STANDARDIZATION, STRUCTURAL PROPERTIES, SURFACE CHEMISTRY, SURFACE REACTIONS, SURFACES, THEORY, TUNNELING, VOLTAGE.

IDENTIFIERS: (U) PE61102F, WJAFOSR2303A2, *Scanning tunneling microscopy.

AD-A199 922

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 905 11/2

AD-A199 905 CONTINUED

FLORIDA UNIV GAINESVILLE DEPT OF MATERIALS SCIENCE AND
ENGINEERING

(U) Ultrastructure Processing and Environmental Stability
of Advanced Structural and Electronic Materials.

EQUIPMENT, OPTICS, RANGE(EXTREMES), REFLECTION,
RELIABILITY, REPRODUCIBILITY, SILICON, STABILITY,
STABILIZATION, STRUCTURAL PROPERTIES, TEMPERATURE,
THERMAL EXPANSION.

DESCRIPTIVE NOTE: Final rept. 1 Apr 85-31 Mar 88.

IDENTIFIERS: (U) PE81102F, WJAF05R2303A3,
*Ultrastructure processing.

SEP 88 38P

PERSONAL AUTHORS: Hensch, Larry L.

CONTRACT NO. F49620-85-C-0079

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0972

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of our Multi-Investigator Research Program is to achieve an understanding of the science of chemically derived, ultrastructure processing of ceramics, glasses and composites. Five research areas were pursued. Sol-Gel Processing: Procedures for reliable and reproducible drying of sol-gel silica monoliths were developed using drying control chemical additives (DCCA's). Processes for chemical stabilization of ultraporous, optically transparent silica monoliths were also developed along with the means for chemically doping of optically active polymers. A method for dehydration and densification of the ultrapure silica monoliths was also achieved resulting in optical components with uniquely low optical transmission from 180 nm to 3500 nm. The gel-derived optical silica also has a uniquely low coefficient of thermal expansion over a broad temperature range. Keywords: Glass, Surfaces, Optics, Ultrastructure, Infrared reflection spectroscopy, Microstructure, Gels, Gel-glass transformation, ElectrokINETICS, Processing, Composites, Silica, Silicon. (JES)

DESCRIPTORS: (U) *GELS, *SILICON DIOXIDE, ADDITIVES, CHEMICALS, COEFFICIENTS, CONTROL, DEHYDRATION, DENSITY, DRYING, ELECTROKINETICS, ENVIRONMENTS, INFRARED SPECTROSCOPY, LIGHT TRANSMISSION, MICROSTRUCTURE, OPTICAL

AD-A199 905

AD-A199 905

UNCLASSIFIED

PAGE 97

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 881 17/10

AD-A199 881 CONTINUED

ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL
RESEARCH KJELLER

LINES, FIELD CONDITIONS, FINLAND, INFORMATION CENTERS,
NORTHERN EUROPE, NORWAY, PREPARATION, SEISMIC DATA,
SEISMOMETERS, SITES, SYNCHRONISM, TELEMETERING DATA.

(U) Development and Evaluation of a New Regional Seismic
Array in Fennoscandia.

IDENTIFIERS: (U) Regional seismic arrays, WUAFOSR495010,
PE62714E.

DESCRIPTIVE NOTE: Final rept. 15 Nov 86-14 Dec 87,

MAY 88 58P

PERSONAL AUTHORS: Mykkeltveit, Svein

CONTRACT NO. F49620-87-C-0032, SARPA Order-4950

PROJECT NO. 4950

TASK NO. 10

MONITOR: AFOSR
TR-88-1009

UNCLASSIFIED REPORT

ABSTRACT: (U) The main purpose of this effort is to conduct research on how several regional seismic arrays can be employed together using the pooled seismic data in a simultaneous processing scheme. A site for deployment of a new array was identified in northern Norway and final approval for permission to deploy an array at this site was granted in early July 1987. This report describes the work associated with the different tasks of the site preparation and field system deployment, the arrangements for satellite transmission of data from the array site to NORSAR's data processing center at Kjeller, and the installation of an interim system for acquiring and archiving data at Kjeller. A central terminal building was constructed to house the core of the field system. Approximately 30 km of both fiber optic and power cables were trenching to connect the seismometer sites with the central building. 25 seismometer surface vaults were built, and a borehole for the broadband seismometer was prepared at the center of the array. The system was ready for operation in early November. Keywords: Beam forming. (EDC)

DESCRIPTORS: (U) *SEISMIC ARRAYS, BEAM FORMING,
BROADBAND, DATA PROCESSING, DATA TRANSMISSION SYSTEMS,
DEPLOYMENT, ELECTRIC CABLES, FIBER OPTICS TRANSMISSION

AD-A199 881

AD-A199 881

UNCLASSIFIED

PAGE 53

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A199 878 8/4

AD-A199 874 13/1 20/13 20/4

CALIFORNIA UNIV MEDICAL CENTER LOS ANGELES

DAYTON UNIV OH RESEARCH INST

(U) Neurophysiological Research Supporting the Investigation of Adaptive Network Architectures.

(U) Interface Stability between Two Gas Streams of Different Density in a Curved Flow.

DESCRIPTIVE NOTE: Final rept. 1 Jun 85-31 Jul 88,

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Mar 88,

MAY 88 100P

AUG 88 80P

PERSONAL AUTHORS: Woody, Charles D.

PERSONAL AUTHORS: Minardi, J. E.; Skomrock, M. P.; Von Ohain, Hans; Lawson, M. O.; Boehman, L. I.

CONTRACT NO. F49620-85-C-0100

REPORT NO. UDR-TR-88-84

PROJECT NO. 2312

CONTRACT NO. AFOSR-88-0137

TASK NO. A1

PROJECT NO. 2307

MONITOR: AFOSR

TR-88-0984

TASK NO. A4

UNCLASSIFIED REPORT

ABSTRACT: (U) Research demonstrated that rates of learning of a conditioned eyeblink response in cats could be significantly accelerated by adding electrical stimulation of the hypothalamic region of the brain at the appropriate time interval in relation to the conditioning stimuli. This learning model was extended to obtain rapid conditioning of single cortical neurons. Changes in currents in the conditioned cells were detected using the single electrode voltage clamp technique. Long lasting increases in input resistance and excitability similar to those produced by acetylcholine were found after applications of cyclic GMP-dependent protein kinase and cAMP. Keywords: Conditioning stimuli; Conditioning cortical neurons; Acetylcholine. (aw/mjm)

DESCRIPTORS: (U) *CONDITIONING(LEARNING), *NEUROPHYSIOLOGY, *STIMULATION(PHYSIOLOGY), *NERVE CELLS, ACETYLCHOLINE, ADAPTIVE SYSTEMS, ARCHITECTURE, BRAIN, CATS, CELLS(BIOLOGY), ELECTRIC CURRENT, INPUT, MODELS, NETWORKS, RATES, RESISTANCE, CEREBRAL CORTEX, EYE MOVEMENTS, CONDITIONED RESPONSE, ELECTROPHYSIOLOGY, TIME INTERVALS.

AD-A199 878

UNCLASSIFIED REPORT

ABSTRACT: (U) More severe temperature conditions require novel cooling methods for small turbines. A concept applicable to small turbines is described. It involves co-flowing streams within the turbine blade passage: one cold and one hot. This concept, referred to as the Radial Turbine, provides for strong blade cooling even in very small turbines where traditional cooling approaches cannot be used. However, fundamental studies of turbulent flow in curved channels of two streams of different total pressure and temperature are required to provide the basic information needed in understanding this co-flowing streams in a curved channel. This report covers the design of an experimental apparatus that will be used for investigating the interface stability between two gas streams of different densities in a curved flow and reports on flow visualization studies performed with the apparatus. Several types of instability are possible in these curved mixing layers and they are discussed in the report. (JHD)

DESCRIPTORS: (U) *AIR COOLED, *TURBINE BLADES, *TURBINES, *TURBULENT FLOW, ADVERSE CONDITIONS, BLADES, CHANNELS, COOLING, CURVATURE, GAS FLOW, FLOW VISUALIZATION,

AD-A199 874

UNCLASSIFIED

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 874 CONTINUED

AD-A199 873 20/8.1

INTERFACES, LAYERS, HEAT TRANSFER, METHODOLOGY, MIXING,
STABILITY, TEMPERATURE.

PARAMETRICS INC WALTHAM MA

(U) Electromagnetic Cross Sections of Conductive Fibers:
Modified Drude Equations and Dependence of Dielectric
Constant on Particle Size.

IDENTIFIERS: (U) PE81102F, WUAF0SR2307A4.

DESCRIPTIVE NOTE: Final rept. 15 Apr 87-15 Jun 88.

AUG 88 50P

PERSONAL AUTHORS: Pedersen, N. E.; Waterman, P. C.;
Pedersen, J. C.

CONTRACT NO. F49820-87-C-0051

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFDSR
TR-88-1019

UNCLASSIFIED REPORT

ABSTRACT: (U) Our ability to compute the electromagnetic scattering, absorption, and extinction cross sections of randomly oriented electrically conducting thin fibrous particles has improved substantially over the past five years or so. Electronic Properties of Metals: In order to be able to apply our computations to the infrared and visible, as well as the microwave case, it is necessary to build in the optical behavior of the fibers. In addition, in order to include extremely small fiber diameters, the dependence of the electrical conductivity upon particle radius must be included. These effects will now be considered. (JES)

DESCRIPTORS: (U) *FIBER OPTICS, ABSORPTION, BEHAVIOR, COMPUTATIONS, CONDUCTIVITY, CONSTANTS, CROSS SECTIONS, DIAMETERS, DIELECTRIC PROPERTIES, ELECTRICAL CONDUCTIVITY, ELECTROMAGNETIC SCATTERING, ELECTROMAGNETISM, ELECTRONICS, EQUATIONS, EXTINCTION, FIBERS, INFRARED RADIATION, METALS, MICROWAVES, OPTICAL PROPERTIES, PARTICLE SIZE, PARTICLES, RADIUS(MEASURE), THINNESS.

IDENTIFIERS: (U) PE81102F, WUAF0SR2308A3, *CONDUCTIVE FIBERS.

AD-A199 874

AD-A199 873

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 841 CONTINUED

AD-A199 841 7/2 7/3

UTAH UNIV SALT LAKE CITY

(U) Use of D2 to Elucidate OMVPE (Organometallic Vapor Phase Epitaxial) Growth Mechanisms.

DESCRIPTIVE NOTE: Annual rept. 15 Jun 87-14 Jun 88.

AUG 88 162P

PERSONAL AUTHORS: Stringfellow, Gerald B.

CONTRACT NO. AFOSR-87-0233

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR
TR-88-0878

UNCLASSIFIED REPORT

ABSTRACT: (U) Research during the first year of this project has concentrated on determining the pyrolysis mechanisms for the precursor molecules trimethylgallium (TMGa), trimethylindium (TMIIn), arsine (AsH₃), and phosphine (PH₃) commonly used for organometallic vapor phase epitaxial growth (OMVPE) of III/V semiconductors. The technique used is mass spectrometry with the pyrolysis occurring in various ambients including H₂, He, and D₂. The latter allows labelling of reaction products involving interactions with the ambient. TMGa and TMIIn were discovered to pyrolyze by a new mechanism involving H (D) radicals. The hydrides decompose by heterogeneous release of H atoms. Together, the TMIIn and group V hydride pyrolyze via a concerted reaction involving formation of an adduct. In addition, pyrolysis and OMVPE growth studies were conducted using the newly developed group V sources tertiarybutylarsine (TBAs) and tertiarybutylphosphine (TBP). These precursors pyrolyze by radical processes where a t-butyl radical is produced which subsequently attacks the parent molecule. Adding TMGa to the system has no effect on either TBAs or TBP pyrolysis. Keywords: Hydrogen, Helium, Deuterium. (MUM)

DESCRIPTORS: (U) *ARSINES, *DEUTERIUM, *HYDRIDES, *PHOSPHINE, *GALLIUM COMPOUNDS, *INDIUM COMPOUNDS, *EPITAXIAL GROWTH, GROWTH(GENERAL), HELIUM, HETEROGENEITY.

AD-A199 841

AD-A199 841

UNCLASSIFIED

PAGE 101

E.L. MOORE

HYDROGEN, MASS SPECTROMETRY, MOLECULES, ORGANOMETALLIC COMPOUNDS, PYROLYSIS, REACTANTS(CHEMISTRY), RELEASE, SEMICONDUCTORS, SOURCES, VAPOR PHASES.

IDENTIFIERS: (U) PE61102F, WJAFOSR2306B1,
*Trimethylgallium, *Trimethylindium.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A199 839 7/2 7/4

AD-A199 838 7/4

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Electronic Assignments of the Violet Bands of Sodium,

(U) A Nonmenclature for Lambda-Doublet Levels in Rotating Linear Molecules,

SEP 86 5P

AUG 88 7P

PERSONAL AUTHORS: Pichler, G.; Bahns, J. T.; Sando, K. M.; Stwalley, W. C.; Konowalow, D. D.

PERSONAL AUTHORS: Alexander, M. H.; Andresen, P.; Bacis, R.; Bersohn, R.; Comes, F. J.

CONTRACT NO. AFOSR-85-0381

CONTRACT NO. AFOSR-85-0381

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. 81

TASK NO. 87

MONITOR: AFOSR TR-88-0843

MONITOR: AFOSR TR-88-0842

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v129 n4 p425-428, 5 Sep 86.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v89 n4 p1749-1753, 15 Aug 88.

ABSTRACT: (U) The puzzling violet bands of sodium (approx. 425-460 nm), known since 1932, are shown conclusively to arise from the superposition of two distinct continuum emission bands - one singlet (21 sigma u x 1 sigma g-) and one triplet (primarily 23 pi g 1 3 sigma u). Each continuum emission system shows complex interference structure arising from multiple branches of the Mulliken difference potential. Reprints, Sodium. (MUM)

ABSTRACT: (U) It is proposed that the two lambda-doublet levels of linear molecules with nonzero electronic orbital angular momentum be labeled lambda(A') and lambda(A), e.g., pi(A') and pi(A) for pi states, etc., according to the following prescription: All series of levels in which the electronic wave function at high J is symmetric with reflection of the spatial coordinates of the electrons in the plane of rotation will be designated lambda(A') for all values of J, and all those for which the electronic wave function is antisymmetric with respect to reflection will be denoted lambda(A). It is emphasized that this notation is meant to supplement, and not replace, the accepted spectroscopic e/f labeling and the parity quantum number. The utility of the lambda(A')/lambda(A) notation is that is of most relevance in the mechanistic interpretation of reactive or photodissociative processes involving open-shell molecules. Reprints. (MUM)

DESCRIPTORS: (U) *BAND SPECTRA, *EMISSION SPECTRA, *SODIUM, ELECTRONICS, EMISSION, INTERFERENCE, REPRINTS.

DESCRIPTORS: (U) *LINEAR SYSTEMS, *ELECTRON SPIN RESONANCE, *QUANTUM CHEMISTRY, MOLECULES, PHOTODISSOCIATION, REPRINTS.

IDENTIFIERS: (U) PE81102F, WJAFOSR230381, Violet(color), Singlet states, Triplet states.

IDENTIFIERS: (U) PE81102F, WJAFOSR230387.

AD-A199 839

AD-A199 838

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 837 CONTINUED

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) High Resolution Spectroscopic Studies of Small Molecules.

DEC 87 14P

PERSONAL AUTHORS: Field, N. W.

CONTRACT NO. AFOSR-85-0381

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0944

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B1, *vinylidene.

*SPECTROSCOPY, *VINYL PLASTICS, ACCESS, AMPLITUDE, BARRIERS, DETECTION, DISSOCIATION, EMISSION, FREQUENCY, HARMONICS, HIGH ENERGY, HIGH RESOLUTION, INTERNAL, LEVEL(QUANTITY), LIMITATIONS, MOLECULES, POTENTIAL ENERGY, PUMPING, REPRINTS, STIMULATION(GENERAL), THERMOCHEMISTRY, VIBRATION, VIBRATIONAL SPECTRA.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. De Physique, Colloque C7, v48 n12 pC7-17-C7-28 Dec 87.

ABSTRACT: (U) Four spectroscopic examples will be discussed: (i) Stimulated Emission Pumping (SEP) spectroscopy of formaldehyde, an example of a well-behaved molecule in the small amplitude limit, for which a complete set of harmonic vibrational frequencies (ω) and anharmonicity (x_{ij}) is determined; (ii) Perturbation Facilitated Optical-Optical Double Resonance (PFODR) spectroscopy of Lithium, illustrating access to triplet states and the phenomenon of accidental predissociation; (iii) determination of an upper bound to the HCC-H dissociation energy of acetylene by Zeeman Anti-Crossing (ZAC) spectroscopy, a cooperative predissociation scheme similar to the accidental predissociation in L12 whereby, despite potential energy barriers, one can ensure that the onset of dissociation will be detected not far above the thermochemical limit; (iv) detection and characterization of a vinylidene-vibrational level through the effect of acetylene-vinylidene isomerization on the cross-correlation of acetylene SEP spectra, illustrating a new, direct way of sampling intramolecular dynamics at such high internal energies that vibrational spectra are intrinsically unassignable. Reprints (WJW)

DESCRIPTORS: (U) *ACETYLENE, *FORMALDEHYDE, *LITHIUM,

AD-A199 837

AD-A199 837

UNCLASSIFIED

PAGE 103

E/JOLF

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A199 832 6/4

AD-A199 831 20/5

FLORIDA UNIV GAINESVILLE DEPT OF PHYSIOLOGY

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Complex Auditory Signals.

(U) Collisional-Induced Absorption in Calcium Rare-Gas Collisions.

DESCRIPTIVE NOTE: Final rept. 15 Sep 85-14 Sep 88.

AUG 88 6P

SEP 88 123P

PERSONAL AUTHORS: Coutts, J.; Peck, S. K.; Cooper, J.

PERSONAL AUTHORS: Green, David W.

CONTRACT NO. AFDSR-84-0027

CONTRACT NO. AFDSR-85-0374

PROJECT NO. 2313

TASK NO. A6

TASK NO. B1

MONITOR: AFOSR TR-88-0985

MONITOR: AFOSR TR-88-0940

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Human detection of complex sounds were examined experimentally and theoretically. Three separate phenomena were studied: comodulation effects, perception of nonstationary spectra and detection of changes in static spectra. Results are briefly outlined and detailed in a number of attached preprints. (AW/MUM)

ABSTRACT: (U) The collisionally induced line shapes are investigated corresponding to the 1 sub 0 to 1 D sub 2 4575-A electric quadrupole transition in neutral calcium for a variety of rare-gas perturber species. The results are interpreted in terms of molecular potentials. Keywords: Collisional induced absorption; Calcium rare gas collisions; Molecular potentials; Reprints. (JHD)

DESCRIPTORS: (U) *AUDITORY SIGNALS, *AUDITORY PERCEPTION, *HEARING, DETECTION, HUMANS, SOUND, SPECTRA, STATICS, AUDITORY ACUITY.

DESCRIPTORS: (U) *ABSORPTION, *COLLISIONS, *RARE GASES, *SURFACE CHEMISTRY, CALCIUM, MOLECULAR PROPERTIES, NEUTRAL, REPRINTS, SPECTRAL LINES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2313A6.

IDENTIFIERS: (U) PE81102F, WUAFOSR230381.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Applied Physics. v64 n3 p977-981 Aug 88.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A199 826 6/4

AD-A199 823 12/3

ROCHESTER UNIV N Y CENTER FOR VISUAL SCIENCE

TEXAS A AND M UNIV COLLEGE STATION DEPT OF STATISTICS

(U) New Insights on Visual Cortex. Abstracts. Center for Visual Science Symposium (18th) Held in Rochester, New York on June 16-18, 1988.

(U) Discussion of Box's 1987 Article in Technometrics.

DESCRIPTIVE NOTE: Final rept..

PERSONAL AUTHORS: Carroll, Raymond J.; Ruppert, David

JUN 88 36P

CONTRACT NO. F49620-85-C-0144, \$NSF-DMS87-01201

PERSONAL AUTHORS: Makous, Walter; Maunsell, John; Pasternak, Tatiana

PROJECT NO. 2304

CONTRACT NO. AFOSR-88-0170

TASK NO. A5

PROJECT NO. 2313

MONITOR: AFOSR
TR-88-0983

TASK NO. A5

UNCLASSIFIED REPORT

MONITOR: AFOSR
TR-88-0983

SUPPLEMENTARY NOTE: Pub. in Technometrics, v30 n1 p30-31
Feb 88.

UNCLASSIFIED REPORT

ABSTRACT: (U) This is a record of the sixteenth symposium sponsored by the Center for Visual Science at the University of Rochester on June 15-18, 1988. It consists of abstracts from the papers presented at the meeting and a list of the participants. Five topical sessions each included four papers. The sessions were: early visual processing, parallel channels cortical processing (approaches), levels of cortical processing, and visuomotor integration. Keywords: Symposia; Visual cortex; Vision; Visual perception. (kt)

DESCRIPTORS: (U) *VISUAL CORTEX, *VISUAL PERCEPTION, IMAGE PROCESSING, INTEGRATION, MOTOR REACTIONS, NEW YORK, OPTICAL IMAGES, SYMPOSIA, VISION.

IDENTIFIERS: (U) PE81102F, WJAFOSR2313A5.

ABSTRACT: (U) Professor Box is to be congratulated for his timely and informative article. Along with Box and Fung (1983, 1986), Box and Meyer (1986a,b; 1987) and Leon Shoemaker, and Kacker (1987), this article provides the statistics community with a clearer sense of the meaning of the term 'Taguchi's method' and how to improve it. Although we do not work in the area of quality control, we do have experience in areas that overlap in terms of statistical analysis. The overlap occurs after a screening analysis has been undertaken to identify those factors that affect the response. Some of our experience is related in Carroll and Ruppert (1987, 1988) and Davidian and Carroll (1987). One interesting component of Box's article is the idea that a transformation of the data can be found that induces not homoscedasticity, but a partial separation of the factors affecting mean and variance. (mgm)

DESCRIPTORS: (U) *STATISTICAL ANALYSIS, OVERLAP, QUALITY CONTROL, SEPARATION, STATISTICS, TRANSFORMATIONS, MEAN, ANALYSIS OF VARIANCE, NUMERICAL METHODS AND PROCEDURES.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A5.

AD-A199 826

AD-A199 823

UNCLASSIFIED

PAGE 105

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 822 12/3

AD-A199 822 CONTINUED

TEXAS A AND M UNIV COLLEGE STATION DEPT OF STATISTICS

(U) Variance Function Estimation,

IDENTIFIERS: (U) PE81102F, WJAFDSR2304A5,
Heteroscedastic regression models.

DEC 87 14P

PERSONAL AUTHORS: Davidian, M.; Carroll, R. J.

CONTRACT NO. F49820-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0939

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American
Statistical Association, V82 n400 p1079-1091 Dec 87.

ABSTRACT: (U) Heteroscedastic regression models are used in fields including economics, engineering, and the biological and physical sciences. Often, the heteroscedasticity is modeled as a function of the covariates or the regression and other structural parameters. Standard asymptotic theory implies that how one estimates the variance function, in particular the structural parameters, has no effect on the first-order properties of the regression parameter estimates; there is evidence, however, both in practice and higher-order theory to suggest that how one estimates the variance function does matter. Further in some settings, estimation of the variance function is of independent interest or plays an important role in estimation of other quantities. This reprint studies variance function estimation in a unified way, focusing on common methods proposed in the statistical and other literature, to make both general observations and compare different estimation schemes. It is shown that there are significant differences in both efficiency and robustness for many common methods. (kr)

DESCRIPTORS: (U) *ESTIMATES, *REGRESSION ANALYSIS, *ANALYSIS OF VARIANCE, ASYMPTOTIC SERIES, BIOLOGY, ECONOMICS, FOCUSING, FUNCTIONS, PARAMETERS, PHYSICAL SCIENCES, STRUCTURAL PROPERTIES, VARIATIONS.

AD-A199 822

AD-A199 822

UNCLASSIFIED

PAGE 108

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 821 12/3

AD-A199 821 CONTINUED

TEXAS A AND M UNIV COLLEGE STATION

(U) The Effects of Variance Function Estimation on Prediction and Calibration. An Example.

88 11P

DESCRIPTORS: (U) *ANALYSIS OF VARIANCE, *LINEAR REGRESSION ANALYSIS, *MATHEMATICAL MODELS, ASSAYING, ASYMPTOTIC SERIES, CALIBRATION, ESTIMATES, EXPERIMENTAL DESIGN, INTERVALS, JAPAN, MONOTONE FUNCTIONS, PREDICTIONS, QUALITY CONTROL, REPRINTS, STATISTICS, VARIATIONS.

PERSONAL AUTHORS: Carroll, Raymond J.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0864

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Statistical Decision Theory and Related Topics IV. Volume 2, p273-280 1988.

ABSTRACT: (U) This reprint considers a heteroscedastic regression model. In the linear regression model with a reasonably sized data set, since unweighted least squares in consistent its fitted values rarely differ much from the fitted values from a generalized least squares fit. Consequently, the usual practice is to treat the estimation of the variance function $g(\chi^2, \beta, \theta)$ fairly cavalierly, if at all. The narrow focus on estimating the mean is misplaced, as Schwartz later notes. Box & Meyer (1985) state that one distinctive feature of Japanese quality control improvement techniques is the use of statistical experimental design to study the effect of a number of factor on variance as well as the mean. Other times the variance function essentially determines the quantity of interest. It is perhaps trite to state that how well one estimates the variance function has a large effect on how well one can do prediction and calibration. It is, however, a point that is rarely taken into account in practice, as any review of the techniques in the assay literature will show. We construct an asymptotic theory outlined in section 3, where we show that the difference in the length of a prediction interval between θ known and unknown is asymptotically distributed with variance a monotone function of how well one estimates θ . (kr)

AD-A199 821

AD-A199 821

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 820 20/3 20/12 CONTINUED

STANFORD UNIV CA DEPT OF APPLIED PHYSICS

YTTRIUM COMPOUNDS.

(U) Detectors of Infrared Radiation Based on High T(c) Superconducting YBCO Films.

IDENTIFIERS: (U) PE81102F, WJAFOSRD81281, Copper oxides.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 87-23 Feb 88.

FEB 88

PERSONAL AUTHORS: Geballe, T.H.

CONTRACT NO. F49620-88-C-0002

PROJECT NO. D812

TASK NO. B1

MONITOR: AFOSR
TR-88-0871

UNCLASSIFIED REPORT

ABSTRACT: (U) We achieved control over the orientation and microstructure of the thin films of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ (YBCO). We elucidated the optical properties of YBCO, including the penetration depth (which turned out to be rather small) and the optical anisotropy (which is rather large). We have observed photo-induced signals (i.e. changes in resistivity) of YBCO films in superconducting state as well as in the normal state upon illumination with short pulsed IR radiation generated by the Stanford free electron laser. Intensive work has been continued, and substantial advances made, in the construction of in-situ-growth facilities. Noise measurements have been made using films. The noise is found to increase markedly as the quality of the films deteriorates. Raman effect measurements and ellipsometric measurements, give further diagnostic information as to film quality and further understanding of the basic processes going on in the films. Keywords: Copper oxides, Yttrium compounds, Barium compounds. (JHD)

DESCRIPTORS: (U) *INFRARED DETECTORS, *FILMS, *SUPERCONDUCTORS, ANISOTROPY, BARIUM COMPOUNDS, COPPER COMPOUNDS, DEPTH, DIAGNOSIS(GENERAL), ILLUMINATION, INFRARED RADIATION, MEASUREMENT, MICROSTRUCTURE, NOISE(ELECTRICAL AND ELECTROMAGNETIC), OPTICAL PROPERTIES, OXIDES, PENETRATION, RAMAN SPECTRA, ELECTRICAL RESISTANCE.

AD-A199 820

AD-A199 820

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 811 11/8

AD-A199 811 CONTINUED

DREXEL UNIV PHILADELPHIA PA DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING

- (U) Research on the Statistics of Grain Lattice Echoes and
Their Use in Grain Size Estimation and Grain Echo
Suppression.

the demonstration of the utility of SSP in many
engineering materials such as centrifugally cast
stainless steel (CCSS), composites and interface between
bimetallic alloys. The potential of SSP as a tool for
material characterization is also experimentally
demonstrated. Theses. (FR)

DESCRIPTIVE NOTE: Final rept. 1 Jun 84-31 Mar 88,

DESCRIPTORS: (U) *ACOUSTIC SIGNALS, *GRAIN
STRUCTURES(METALLURGY), *SIGNAL PROCESSING, *ULTRASONIC
RADIATION, ALGORITHMS, ALLOYS, BIMETALS, CASTINGS,
COHERENCE, ESTIMATES, CRYSTAL LATTICES, FOURIER ANALYSIS,
FREQUENCY, FREQUENCY DIVERSITY, GRAIN SIZE, INTEGRALS,
MATERIALS, MODELS, NOISE, PARAMETERS, PHYSICAL PROPERTIES,
PROCESSING, SAMPLING, SPECTRA, SPLITTING, STAINLESS STEEL,
THEOREMS, THEORY, THESES, TIME.

AUG 88 170P

PERSONAL AUTHORS: Karpur, Prasanna; Newhouse, V. L.;
Disque, Robert C.

CONTRACT NO. AFOSR-84-0125

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-88-1012

UNCLASSIFIED REPORT

ABSTRACT: (U) Split spectrum processing (SSP) was
developed in the late seventies for ultrasonic
applications as a convenient method of introducing
frequency diversity in ultrasonic signals for the purpose
of the reduction of coherent material noise. Although the
technique is very powerful, the use of SSP remained
somewhat limited because of the ambiguity that prevailed
in the selection of suitable processing parameters. The
ambiguity was mainly because of a lack of a physical
model of the spectral splitting process. The need for
such a physical modeling has been fulfilled as a part of
this dissertation. An ultrasonic signal has been modeled
as a time limited process which facilitates the use of
the frequency sampling theorem to describe the frequency
splitting process. Further, the theory of Fourier
integrals is used to determine the bandwidth of the
theoretical SINC filters obtained as per the frequency
sampling theorem. Experimental results have been provided
to corroborate the theory. Another aspect of SSP
addressed by this thesis is a detailed theoretical
analysis of a newly developed algorithm called the
Polarity Thresholding (PT) algorithm. Yet another
important aspect of SSP addressed by this dissertation is

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A3, SSP(Spectrum
split processing), Spectrum split processing, Grain echo
suppression, Grain lattice echoes.

AD-A199 811

AD-A199 811

UNCLASSIFIED

AD-A199 810 12/1 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 810 CONTINUED

WISCONSIN UNIV-MADISON CENTER FOR MATHEMATICAL SCIENCES

(U) Some Problems in Nonlinear Analysis.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 87-31 May 88.

MAY 88 8P

PERSONAL AUTHORS: Crandall, M. G.; Rabinowitz, P. H.

CONTRACT NO. AFOSR-87-0202

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-88-0987

UNCLASSIFIED REPORT

ABSTRACT: (U) M. G. Crandall has been working on several problems: existence questions for abstract evolution equations, existence and uniqueness for certain classes of parabolic, Hamilton-Jacobi, and degenerate elliptic equations, and questions related to the control of partial differential equations. P. H. Rabinowitz has been studying the existence of periodic and connecting orbits for certain nonlinear pendulum type equations. He has obtained the existence of periodic and subharmonic solutions for families of singular Hamiltonian systems. A post-doctoral fellow, S. Angewent has developed a new approach to a class of maps of interest in the study of dynamical systems. He is also working on nonlinear parabolic equations such as arise in modelling the melting of solids and on problems in population dynamics. Four predoctoral students are treating problems on periodic solutions of finite and infinite dimensional Hamiltonian systems, on variational methods to treat ordinary and partial differential equations, and on the relationship between differential games and viscosity solutions of the Hamilton-Jacobi equation. (KR)

DESCRIPTORS: (U) *NONLINEAR ANALYSIS, ABSTRACTS, DIFFERENTIAL EQUATIONS, DYNAMICS, ELLIPSES, EQUATIONS, EVOLUTION(GENERAL), GAME THEORY, HAMILTONIAN FUNCTIONS, HARMONICS, JOINING, MAPS, MELTING, NONLINEAR ALGEBRAIC

AD-A199 810

AD-A199 810

UNCLASSIFIED

PAGE 110

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 809 12/3

AD-A199 792 7/2 7/4

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) A Langevin-Type Stochastic Differential Equation on a Space of Generalized Functionals.

(U) Electronic States of the Xe(n)HCl Systems in Gas and Condensed Phases,

DESCRIPTIVE NOTE: Rept. for 1 Sep 87-31 Aug 88,

SEP 88 9P

AUG 88 54P

PERSONAL AUTHORS: Last, Isidore; George, Thomas F.

PERSONAL AUTHORS: Kallianpur, G.; Mitoma, I.

REPORT NO. TR-73

REPORT NO. TR-238

CONTRACT NO. F49620-86-C-0009

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2303

PROJECT NO. 2304

TASK NO. A2

TASK NO. A8

MONITOR: AFOSR
TR-88-0981

MONITOR: AFOSR
TR-88-0988

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Recently, Deuschel has obtained a fluctuation result for system of lattice valued diffusion processes. The result obtained is similar to the ones for mean-field interacting particle diffusions treated in a number of papers. In another direction, Kallianpur and Wolpert have introduced a class of stochastic differential equations (SDE's) governing nuclear space valued processes as model for voltage potentials for spatially extended neurons. This paper is motivated by both the above problems, especially, the problem of interacting systems. The techniques developed in this paper enable us to prove a general result which yields a central limit theorem for such systems. It also provides another approach to the fluctuation theorem in another document. In addition, the identification problem of limit measures leads us to discuss the uniqueness of weak solutions of the SDE. (kr)

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *STOCHASTIC PROCESSES, DIFFUSION, IDENTIFICATION, INTERACTIONS, LIMITATIONS, NERVE CELLS, SOLUTIONS(GENERAL), THEOREMS, VARIATIONS, VOLTAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A8.

AD-A199 809

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v89 n5 p3071-3078, 1 Sep 88.

ABSTRACT: (U) Systems formed by one Cl, one H and one or several Xe atoms are considered by the semiempirical diatomics-in-ionic-systems method, which takes into account the charge delocalization in ionic states and the coupling between the neutral and ionic states. Calculations are performed both for gas phase systems, such as van der Waals complexes and clusters XeHCl (n= 1, 2, 4, 7, 8, 12) and ionic molecules (HXen)+Cl-, and for systems formed in Xe solids doped by HCl molecules. The calculations give the structure of the systems, dissociation energies and energies of electronic transitions. The calculations show, in particular, the existence of the ground-state ionic molecule (HXe)+Cl-, the decrease of the HCl electronic excitation energy in clusters and solids, and the increase of the emission photon energy of the ionic HXeCl- systems as compared to the XeCl- molecule. Keywords: Xenon compounds; Hydrogen chloride, Electronic states, Reprints, Gas phase, Condensed phase, Van der Waals clusters, Solid matrices. (MJM)

DESCRIPTORS: (U) *ELECTRON TRANSITIONS, *HYDROGEN CHLORIDE, *VAPOR PHASES, *XENON, ATOMS, CHEMICAL

AD-A199 792

UNCLASSIFIED

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A199 792 CONTINUED

AD-A199 730 7/3 7/4

DISSOCIATION, CONDENSATION, ELECTRONIC STATES, EMISSION, ENERGY, IONIZATION, NEUTRAL, PHASE, PHOTONS, REPRINTS, SOLIDS.

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY
(U) Laser Fluorescence Excitation Spectrum of Jet-Cooled Tropolone: The A(1) @ sub 2 - X(1) A sub 1 System,

IDENTIFIERS: (U) WJAFOSR2303A2, PE81102F. *Xenon hydrochloride.

JAN 88 8P

PERSONAL AUTHORS: Redington, Richard L.; Chen, Yongqin; Scherer, George J.; Field, Robert W.

CONTRACT NO. AFOSR-85-0381

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0845

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v88 n2, 15 Jan 88.

ABSTRACT: (U) Proton and electron tunneling processes are well known to be of fundamental importance to physics, chemistry, and biology, but the extent to which massive skeletal atoms can participate in such tunneling processes in polyatomic molecules is an important and poorly understood facet of the topic. Some intramolecular tunneling processes, e.g., internal rotation by a symmetric top moiety, are not strongly coupled to other intramolecular motions of the molecule and reduce to one-dimensional problems. 2 Tautomerization tunneling reactions with large amplitude motion by an H atom and shifting of the equilibrium positions of the heavy atoms are of greater chemical interest. In the present article highly mode-specific tunneling doublet separations are reported for normal tropolone, C₇H₅O(H), a molecule which appears to be particularly well qualified for studies of the type under discussion. reprints, hydrocarbons. (MGM)

DESCRIPTORS: (U) *HYDROCARBONS, *LASER INDUCED FLUORESCENCE, *TUNNELING, AMPLITUDE, ATOMS, ELECTRONICS, EQUILIBRIUM(GENERAL), EXCITATION, INTERNAL, MOTION, ONE DIMENSIONAL, POLYATOMIC MOLECULES, REPRINTS, MOLECULAR ROTATION, SHIFTING, SPECTRA, TUNNELING(ELECTRONICS).

AD-A199 792

AD-A199 730

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 730 CONTINUED

AD-A199 729 7/2

MOLECULAR PROPERTIES, HYDROGEN.

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

IDENTIFIERS: (U) P681102F, WJAFOSR2303B1, Tropolone.

(U) Electron Stimulated Desorption from CO Chemisorbed on Pt(111): A Dynamical Study of Positive Ion and Metastable CO Emission.

88 8P

PERSONAL AUTHORS: Kiskinova, M.; Szabo, A.; Lanzillotto, A.-M.; Yates, J. T., Jr

CONTRACT NO. AFOSR-88-0107, \$AFOSR-82-0133

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-88-0959

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Surface Science, V202
PL559-L567 1988.

ABSTRACT: (U) The desorption by electron impact of significant quantities of electronically excited neutral species, CO*, from CO adsorbed on Pt(111) has been discovered. Comparison of the yield of this species as a function of electron energy, coverage, and temperature, with the yield of O+ and CO+ has led to the conclusion that the CO species is mainly produced by direct excitation. Studies of the angular distribution of the three ESD-derived species have been made as a function of temperature, and high amplitude bending vibrational modes are observed. Isotope effects in the three desorption channels have been measured. Keywords: Carbon monoxide, Platinum, Chemisorption, Electron stimulated desorption, Reprints, Isotope effects. (WJM)

DESCRIPTORS: (U) *CARBON MONOXIDE, *CHEMISORPTION, *DESORPTION, *ELECTRON ENERGY, *ELECTRON IMPACT SPECTRA, *PLATINUM, ANGLES, CATIONS, CHANNELS, COMPARISON, DISTRIBUTION, DYNAMICS, ELECTRONS, EXCITATION, ISOTOPES, NEUTRAL, REPRINTS, STIMULATION(GENERAL), YIELD.

IDENTIFIERS: (U) Platinum(111).

AD-A199 730

AD-A199 729

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 728 CONTINUED

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) Fragmentation of Molecular Adsorbates by Electron and Ion Bombardment: Methoxy Chemistry on Al(111),

AUG 88 7P

PERSONAL AUTHORS: Basu, P.; Chan, J. G.; Ng, L.; Colaianni, M. L.; Yates, J. Y., Jr

CONTRACT NO. AFOSR-88-0107

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
YR-88-0880

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v89
n4 p2408-2411, 15 Aug 88.

ABSTRACT: (U) High resolution electron energy loss spectroscopy (HREELS) has been used successfully to provide direct spectroscopic evidence regarding details of the molecular fragmentation of methoxy (CH₃O) on Al(111) caused by energetic electron and ion beams. Chemisorbed methoxy on Al(111) is produced by heating of adsorbed CH₃OH. Irradiation of CH₃O(a) by either energetic (approx 300 eV) electrons or Ar⁺ ions results in C-O and C-H bond scission with simultaneous formation of Al-O and Al-C bonds. During electron stimulated desorption the CH₃O(a) species undergo sequential fragmentation first to CH₂ groups that are captured by the surface and in the final decay process to adsorbed carbon. C-O bonds in CH₃O(a) are depleted preferentially compared to C-H bonds in CH₂(a) species. The electron induced sequential fragmentation of the parent CH₃ group (from methoxy) to resultant CH₂(a) occurs with an efficiency approx. 3 orders of magnitude greater than the subsequent process of CH₂(a)=C(a). Cross sections for various bond scission processes in electron and ion bombardment have been estimated. Methanol, Electron stimulated desorption, Ion bombardment, Methoxy, Chemisorption, Electron energy loss spectroscopy, Reprints. (MUM)

AD-A199 728

AD-A199 728

UNCLASSIFIED

PAGE 114

EVJ00F

DESCRIPTORS: (U) *ADSORBATES, *FRAGMENTATION, *ION BOMBARDMENT, *METHYL RADICALS, *OXYGEN, ADSORPTION, CARBINOLS, CARBON, CHEMISORPTION, CROSS SECTIONS, DECAY SCHEMES, DESORPTION, ELECTRON ENERGY, ELECTRON SPECTROSCOPY, ELECTRONS, ENERGETIC PROPERTIES, ION BEAMS, IONS, LOSSES, MOLECULES, REPRINTS, SEQUENCES, SPECTROSCOPY, STIMULATION(GENERAL).

IDENTIFIERS: (U) WJAFOSR2303A2, PE61102F, Methoxy radicals.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 859 9/1

AD-A199 829 22/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES SCHOOL OF
ENGINEERING

IOWA STATE UNIV AMES ENGINEERING RESEARCH INST

(U) Joint Service Electronics Program: Research in
Electronics.(U) Investigation of Liquid Sloshing in Spin-Stabilized
Satellites.

DESCRIPTIVE NOTE: Final rept. 1 Apr 85-31 Mar 88,

DESCRIPTIVE NOTE: Annual rept. 1 Jan 87-31 Dec 87.

JUN 88 18P

JAN 88 48P

PERSONAL AUTHORS: Steier, William H.

REPORT NO. ISU-ERI-AMES-88175

CONTRACT NO. F49620-85-C-0071

CONTRACT NO. AFOSR-88-0080

PROJECT NO. 2305

PROJECT NO. 2302

TASK NO. A9

TASK NO. B1

MONITOR: AFOSR
TR-88-0799MONITOR: AFOSR
TR-88-1141

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report summarizes the research units supported by Joint Services; the significant research accomplishments described in previous annual reports are listed; and publications and Ph.D Theses are listed as well. Keywords: Electronic materials; Semiconductors; Quantum electronics; Lasers; Communications; Signal processing; Computers controls. (rh)

DESCRIPTORS: (U) *SEMICONDUCTORS, COMPUTERS, CONTROL, ELECTRONIC EQUIPMENT, ELECTRONICS, JOINT MILITARY ACTIVITIES, LASERS, MATERIALS, QUANTUM ELECTRONICS, REPORTS, SIGNAL PROCESSING.

IDENTIFIERS: (U) PB81102F, WJAFOSR2305A9.

ABSTRACT: (U) A vorticity, stream function approach has resulted in a formulation and numerical algorithm for the two-dimensional viscous sloshing problem. A key feature of the formulation is the use of a coordinate transformation that maps the fluid body into a fixed geometric shape. The formulation also removes an initial singularity from the governing equations that would otherwise cause the numerical method to diverge. An experimental test rig has been designed and built to study the interaction of the sloshing fluid and spinning structure. The test rig has been instrumented to monitor the motion of several rotating configurations. In addition, a computer simulation model of the test rig is presently under development. Keywords: Coning of satellites, Nutation due to sloshing fluid, Satellite attitudes. (JHD)

DESCRIPTORS: (U) *ARTIFICIAL SATELLITES, *SLOSHING, *SPINNING(MOTION), ALGORITHMS, SATELLITE ATTITUDE, COMPUTERIZED SIMULATION, CONFIGURATIONS, COORDINATES, EQUATIONS, EXPERIMENTAL DESIGN, FLUIDS, GEOMETRIC FORMS, INSTRUMENTATION, LIQUIDS, MONITORING, NUMERICAL METHODS, AND PROCEDURES, ROTATION, SPIN STABILIZATION, TEST AND EVALUATION, TEST EQUIPMENT, TRANSFORMATIONS, TWO DIMENSIONAL, VISCOSITY, VORTICES.

AD-A199 859

AD-A199 829

UNCLASSIFIED

PAGE 115

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 829 CONTINUED

AD-A199 828 8/7

IDENTIFIERS: (U) PE61102F, WUAFOSR230281, Coning motion,
Mutation, Stream functions.

PURDUE UNIV LAFAYETTE IN SCHOOL OF CIVIL ENGINEERING

(U) Anisotropy and Stress Path Effects in Clays with
Applications to the Pressuremeter Test.

DESCRIPTIVE NOTE: Final rept. 1 Mar 87-31 May 88.

JUL 88 141P

CONTRACT NO. AFOSR-87-0032

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-88-1010

UNCLASSIFIED REPORT

ABSTRACT: (U) The research study undertaken at Purdue focuses towards increasing our understanding of fundamental issues related to the behavior of clays, especially with regard to modelling their anisotropy. The information being developed is applicable to most geotechnical problems, however, in illustrating their usefulness, emphasis is placed on interpretation of in situ tests, and in particular pressuremeter and self-boring pressuremeter (SBPM) tests. There is ample evidence that in situ soils are anisotropic, elastoplastic, stress path and rate dependent, unlike what is generally assumed in test interpretations. Therefore, the study of mechanisms of deformation of in situ tests and their interpretation must take into account these features, and especially the anisotropic nature of the soil deposit. A simple and reliable anisotropic theory will be most useful in the study of several important factors related to pressuremeter testing such as possibility of radial cracking, role of vertical stress, stress conditions at failure, and the effects of initial disturbance which cannot be measured. It will also be possible to estimate undrained strength of the clay in other modes of failure using SBPM data only. (kr)

DESCRIPTORS: (U) *ANISOTROPY, *CLAY, *STRESS ANALYSIS, BEHAVIOR, CRACKING(FRACTURING), DEFORMATION, DEPOSITS, FAILURE, PATHS, RELIABILITY, SOILS, STRESSES, THEORY, VERTICAL ORIENTATION.

AD-A199 829

AD-A199 828

UNCLASSIFIED

PAGE 118

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 628 CONTINUED

AD-A199 627 9/3

IDENTIFIERS: (U) PE81102F, WUAFOSR2302C1, Pressuremeters.

CALIFORNIA UNIV LOS ANGELES DEPT OF PHYSICS

(U) Computer Simulations of Radiation Generation from
Relativistic Electron Beams.

DESCRIPTIVE NOTE: Final rept. 1 Oct 85-30 Sep 87.

SEP 87 81P

PERSONAL AUTHORS: Lin, Anthony T.

CONTRACT NO. F49620-85-K-0021

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-88-1000

UNCLASSIFIED REPORT

ABSTRACT: (U) Research into mode competition in the Lowbitron and efficiency enhancement through magnetic field profiling; a novel method of gain and efficiency enhancement in the CARM (Electron Cyclotron Autoresonance Maser) which makes use of a transverse helical wiggler to inhibit parasitic autoresonant acceleration of electrons by the electromagnetic wave; absolute instability and tunability of the CARM through varying the solenoidal field; and cyclotron effective in an FEL (Free Electron Laser) with an axial guide magnetic field was carried out. The technical specification for a CARM oscillator in the megawatt power range, with the aim of designing a cost effective experiment utilizing an existing Magnetron Injection Gun and a gyrotron magnet, which will serve to verify the basic physics of the CARM and demonstrate its viability was also investigated. Extensive use of computer simulations using relativistic, electromagnetic PIC codes was made in this study. Keywords: Electron cyclotron autoresonance maser, Free electron laser. (JHD)

DESCRIPTORS: (U) *COMPUTERIZED SIMULATION, *CYCLOTRONS, *ELECTROMAGNETIC RADIATION, *EMISSION SPECTRA, *FREE ELECTRON LASERS, COSTS, EFFICIENCY, ELECTRON BEAMS, ELECTRON GUNS, INJECTION, MAGNETRONS, OPTIMIZATION, OSCILLATORS, POWER LEVELS, RADIATION, RELATIVITY THEORY, SOLENOIDS, SPECIFICATIONS, STABILITY.

AD-A199 628

AD-A199 627

UNCLASSIFIED

PAGE 117 E/J007

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 627 CONTINUED

AD-A199 626 7/4

VANDEBILT UNIV NASHVILLE TN

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A8.

(U) Electronic Interactions of Electrons, Photons, and Atoms with Material Surfaces.

DESCRIPTIVE NOTE: Final Rept. Apr 86-Apr 88.

AUG 88 18P

PERSONAL AUTHORS: Toik, Norman H.; Haglund, Richard F., Jr

CONTRACT NO. AFOSR-88-0150

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-88-118

UNCLASSIFIED REPORT

ABSTRACT: (U) The intent of this research program was to elucidate the microscopic mechanisms by which the energy of incoming beams of atoms, ions, electrons and photons is absorbed, localized and redirected to produce neutral-particle desorption from surfaces and subsequent surface modification of restructuring. The model system LiF was used, and the results compared with measurements of electronically desorbed Li-atoms adsorbed on other substrates. This study explored how the degree of surface metallization influences the choice of the final excitation state of the desorbing particle. Measurements were made to compare the desorption of excited state neutral lithium from lithium fluoride by electron, photon and ion bombardment and from lithium-dosed tungsten and lithium-dosed glass by electron and photon bombardment. In the electron and photon desorption experiments, only the first lithium resonance line is observed. These results contrast with the ion sputtering results, where emissions from higher excited states were observed. This suggests that the presence of a metal rich surface provides a channel for de-excitation of excited lithium states which are above the lithium metal Fermi energy. (JHD)

DESCRIPTORS: (U) *DESORPTION. *ELECTRON IRRADIATION.

AD-A199 627

AD-A199 626

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 826 CONTINUED

AD-A199 825 12/8 5/2

*ION BOMBARDMENT, *LITHIUM, *LITHIUM FLUORIDES,
*METALLIZING, *PHOTON BOMBARDMENT, ATOMS, CONTRAST,
ELECTRONICS, EMISSION, ENERGY, EXCITATION, FERMI SURFACES,
INTERACTIONS, IONS, MATERIALS, METALS, MICROSCOPY, MODELS,
MODIFICATION, NEUTRAL, PARTICLES, RESONANCE, SPUTTERING,
SUBSTRATES, SURFACES.

PURDUE UNIV LAFAYETTE IN DEPT OF COMPUTER SCIENCES

(U) Parallel Algorithms for PDE Solvers.

DESCRIPTIVE NOTE: Final rept. Oct 84-Feb 88.

JUL 88 5P

IDENTIFIERS: (U) PE81102F, WJAFOSR2303A2.

PERSONAL AUTHORS: Rice, John R.

CONTRACT NO. AFOSR-84-0385

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-88-1138

UNCLASSIFIED REPORT

ABSTRACT: (U) This report lists all of the 39 scientific publications, these, technical reports and conference presentations supported by the grant AFOSR 84-0385. The principal focus of the results are in 1) The Collocation Method: New versions developed for parallel machines, new results on the convergence and new software were developed, 2) Mapping Algorithms on to Parallel Machines. Fast heuristic algorithms were found, analyzed and tested, a prototype system for automatically mapping PDE algorithms on to parallel architectures were developed. (KR)

DESCRIPTORS: (U) *ALGORITHMS, *HEURISTIC METHODS,
COMPUTER ARCHITECTURE, COMPUTER PROGRAMS, MACHINES,
MAPPING, PROBLEM SOLVING, PARALLEL PROCESSING, PROTOTYPES,
PARTIAL DIFFERENTIAL EQUATIONS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A3.

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 624 5/8

AD-A199 623 14/2

UTAH UNIV SALT LAKE CITY DEPT OF PSYCHOLOGY

NEW HAMPSHIRE UNIV DURHAM

(U) Individual Differences in Attention.

(U) The University of New Hampshire Vacuum Chamber and Charged Particle Calibration Source.

DESCRIPTIVE NOTE: Final rept. 1 Jun 87-31 May 88.

DESCRIPTIVE NOTE: Final rept. 1 Nov 86-31 May 88.

JUL 88 13P

JUL 88 15P

PERSONAL AUTHORS: Johnston, William A.; Hawley, Kevin J.; Farah, M. J.

PERSONAL AUTHORS: Arnoldy, Roger L.

CONTRACT NO. AFOSR-87-0212

CONTRACT NO. AFOSR-87-0018

PROJECT NO. 2313

PROJECT NO. 2817

TASK NO. A7

TASK NO. A8

MONITOR: AFOSR
TR-88-1137MONITOR: AFOSR
TR-88-1035

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Air Force recruits (N = 513) viewed a long series of briefly presented, 4-word arrays. After each array, subjects received one of the four words as a probe and were asked to indicate the array location in which that word had appeared. Subjects were encouraged to distribute their attention evenly across array locations in a divided-attention condition. Different arrays presented different mixtures of novel (never repeated) and familiar (often repeated) words. Somewhat surprisingly, when a single novel word appeared with three familiar words, attention appeared to be allocated preferentially to the novel word. Subjects were encouraged to focus most of their attention on a prespecified location in a focused-attention condition and on a prespecified word in a target-localization condition. Not surprisingly, attention appeared to be allocated preferentially to the prespecified locations and target words in these conditions. (KR)

DESCRIPTORS: (U) *RECRUITS, *ATTENTION, *PSYCHOLOGICAL TESTS, AIR FORCE, ARRAYS, TARGETS, WORDS(LANGUAGE), PERCEPTION(PSYCHOLOGY), COMPARISON, POSITION(LOCATION).

IDENTIFIERS: (U) PE61102F, WDAFOSR2313A7.

AD-A199 624

AD-A199 623

ABSTRACT: (U) This grant provides partial support for the purchase and fabrication of a vacuum chamber facility to be used in the calibration of electron and ion detectors. The detectors are space flight instruments that will be flown aboard sound rockets and future shuttle missions to study the physics of charged particle beam emission in the upper ionosphere and the dumping of trapped radiation by low frequency radio transmitter and lightning strokes.

DESCRIPTORS: (U) *CHARGED PARTICLES, *DETECTORS, *IONS, *PARTICLE BEAMS, *SPACE TECHNOLOGY, *VACUUM CHAMBERS, CALIBRATION, ELECTRONS, EMISSION, FACILITIES, INSTRUMENTATION, IONOSPHERE, LIGHTNING, LOW FREQUENCY, RADIATION, RADIO TRANSMITTERS, SOURCES, SPACE FLIGHT, SPACE MISSIONS, SPACE SHUTTLES, TRAPPING(CHARGED PARTICLES).

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A199 622 7/2

AD-A199 407 20/5

MANCHESTER COLL OF SCIENCE AND TECHNOLOGY (ENGLAND)
DEPT OF CHEMISTRY

OREGON UNIV EUGENE

(U) The Kinetics and Dynamics of Iodine Monofluoride
Formation in Gas-Phase Collisions.

(U) Effects of Autoionizing Resonances on Electron-Impact
Excitation Rates for Be-Like Ions.

DESCRIPTIVE NOTE: Final rept. 1 Dec 84-31 May 88.

APR 88 9P

SEP 88 9P

PERSONAL AUTHORS: Whitehead, J. C.

PERSONAL AUTHORS: Chen, Mau H.; Crasemann, Bernd

CONTRACT NO. AFOSR-85-0039

CONTRACT NO. AFOSR-87-0026

PROJECT NO. 2303

PROJECT NO. 2301

TASK NO. B1

TASK NO. A4

MONITOR: AFOSR
TR-88-1034

MONITOR: AFOSR
TR-88-0768

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The production of IF(B) in gas phase collisions of fluorine atoms with various organic and inorganic iodides has been investigated to determine methods of efficient production. The key role of electronically excited iodine atoms has been identified. Excimer laser photolysis of mixtures of molecular fluorine and organic iodides is shown to yield high pulse intensities of IF(B). Chemical Laser, Iodine Monofluoride, Chemiluminescence. (ngm)

ABSTRACT: (U) The effects of autoionizing resonances on the electron-impact excitation rates for $n=2$ to $n=2$ intrashell transitions in beryllium like ions have been studied for six ions with atomic numbers $Z = 30, 34, 36, 42, 47,$ and 54 . The resonance contributions to the excitation rates were calculated in the isolated-resonance approximation. Detailed Auger and radiative rates were evaluated in the multiconfiguration Dirac-Fock model. Results are compared with background rates from the Coulomb-Born-exchange approximation. Autoionizing resonance have been found to enhance the electron-impact excitation rates by a factor of 2-4 for the electric-dipole-forbidden transitions, while for dipole-allowed transitions, the resonance effects amount to only a few percent of these rates. Reprints.

DESCRIPTORS: (U) *EXCIMER, *FLUORIDES, *IODINE COMPOUNDS, *LASERS, *PHOTOLYSIS, ATOMS, CHEMICAL LASERS, CHEMILUMINESCENCE, COLLISIONS, DYNAMICS, EFFICIENCY, FLUORINE, HIGH RATE, INORGANIC MATERIALS, INTENSITY, IODIDES, IODINE, MOLECULES, PRODUCTION, PULSES, VAPOR PHASES, YIELD.

DESCRIPTORS: (U) *BERYLLIUM, *IONIZATION, *RESONANCE, ATOMIC PROPERTIES, AUGERS, BACKGROUND, DIPOLES, ELECTRONS, EXCITATION, IMPACT, IONS, MASS NUMBER, RADIATION, RATES, REPRINTS, TRANSITIONS.

IDENTIFIERS: (U) PE81102F. WJAFOSR2303B1. *Iodine monofluoride.

IDENTIFIERS: (U) PE81102F. WJAFOSR2301A4.

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v37 p2886-2892, 15 Apr 88.

AD-A199 622

AD-A199 407

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 404 CONTINUED

PRINCETON UNIV NJ

(U) Bioactivity: Studies on a Simple Brain Stem Reflex
in Behaving Animals.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 87-31 May 88,

JUL 88 6P

PERSONAL AUTHORS: Jacobs, Barry L.

CONTRACT NO. AFOSR-87-0301

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-0696

UNCLASSIFIED REPORT

ABSTRACT: (U) A major problem in attempting to understand complex physiological processes, such as brain neuromodulation, or complex behavioral processes, such as arousal, is finding a simple system that will permit such analyses. The brain stem masseteric (jaw closure) reflex in cats is such a system. It is simple, containing only one synapse in brain, and receives dense inputs from two neurochemical systems important in neuromodulation and arousal. Initial pharmacologic studies showed that locally applied norepinephrine facilitated the reflex response. More importantly, physiologic conditions, known to activate the brain norepinephrine system, also facilitated the response. This latter finding was shown to be causal, rather than correlative, by a study which found that the facilitation could be blocked by prior destruction of the norepinephrine input specifically to the reflex circuitry. These data represent the first definitive example of an activational effect in an intact and behaving organism being attributable to a particular central neurotransmitter acting at a specific brain site. The masseteric reflex, is not simply a randomly chosen piece of behavior. Jaw closing (or clenching) is a well known response to stress and a component of the anxiety syndrome. Experimental evidence from studies in humans directly demonstrates that the masseteric reflex response is augmented by fear or anxiety. Thus, the masseteric

reflex represents a simple behavior having direct relevance to bioactivity. (aw)

DESCRIPTORS: (U) *BRAIN, *LEVARTERENOL, *NEUROCHEMISTRY, *REFLEXES, *STRESS(PSYCHOLOGY), ANIMALS, ANXIETY, AUGMENTATION, BEHAVIOR, CATS, FEAR, HUMANS, INPUT, NERVE TRANSMISSION, PHARMACOLOGY, PHYSIOLOGY, RESPONSE(BIOLOGY), SIGNS AND SYMPTOMS, SITES, SYNAPSE, NEUROCHEMICAL TRANSMISSION.

IDENTIFIERS: (U) *Norepinephrine, PE61102F, WUAFOSR2312A.

AD-A199 404

AD-A199 404

UNCLASSIFIED

PAGE 122

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A199 279 20/8

OPTICAL SOCIETY OF AMERICA WASHINGTON D C

(U) Spatial Light Modulators and Applications. 1988
Technical Digest Series, Volume 8.

DESCRIPTIVE NOTE: Final rept.

JUN 88 270P

CONTRACT NO. AFOSR-88-0278

PROJECT NO. 2305

TASK NO. 84

MONITOR: AFOSR
TR-88-1158

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Summaries of papers presented at the
Spatial Light Modulators and Applications Topical Meeting,
South Lake Tahoe, NV., 15-17 Jun 88.

ABSTRACT: (U) Contents: Liquid Crystal Devices: 1,
Liquid Crystal Devices: 2, Photorefractive Devices,
Electro-Optical Devices, Invited Speaker Session, III-V
Devices, Deformable Structures, Opto-Electronic Devices,
Liquid Crystal Devices: 3, Poster Session, Applications:
1, and Applications: 2. (RH)

DESCRIPTORS: (U) *ELECTROOPTICS, *LIGHT MODULATORS,
*LIQUID CRYSTAL DISPLAY SYSTEMS, DEFORMATION, GROUP III
COMPOUNDS, GROUP V COMPOUNDS, SPATIAL DISTRIBUTION,
STRUCTURES.

IDENTIFIERS: (U) PE81102F, WUAFOSR230584.

AD-A199 240 7/2

SRI INTERNATIONAL MENLO PARK CA CHEMICAL PHYSICS LAB

(U) Two-Photon-Excited Fluorescence Spectroscopy of Atomic
Fluorine at 170 nm.

DESCRIPTIVE NOTE: Rept. for period ending May 88.

MAY 88 5P

PERSONAL AUTHORS: Herring, G. C.; Dyer, Mark J.; Jusinski,
Leonard E.; Bischel, William K.

CONTRACT NO. F49620-85-K-0005

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-88-1059

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Optics Letters, v13 n5 p360-
362 May 88.

ABSTRACT: (U) We report what is to our knowledge the
first two-photon-excited fluorescence spectroscopy of
atomic fluorine. A doubled dye laser at 288 nm is Raman
shifted in H2 to 170 nm (sixth anti-Stokes order) to
excite ground-state 2Pj fluorine atoms to the 2Dj level.
The fluorine atoms are detected by one of two methods:
observing the fluorescence decay to the 2Pj level or
observing F+ production through the absorption of an
additional photon by the excited atoms. We have measured
relative two-photon absorption cross sections to and the
radiative lifetimes of the 2Dj states. Keywords: Reprints,
Photons, Excitation, Atomic fluorine. (MJM)

DESCRIPTORS: (U) *FLUORESCENCE, *FLUORINE, *SPECTROSCOPY,
ABSORPTION, ATOMS, DECAY, LIFE SPAN(BIOLOGY), PHOTONS,
RADIATION, REPRINTS, STOKES RADIATION.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A3.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 239

7/2

AD-A199 239 CONTINUED

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Description of a Two-State System: Laser Probing of Gallium Atom Spin-Orbit States from Silicon (100).

JUL 88

22P

PERSONAL AUTHORS: Carleton, Karen L.; Bourguignon, Bernard; Leone, Stephen R.

CONTRACT NO. AFOSR-87-0119

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-88-1050

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science, v199 p447-466 1988.

ABSTRACT: (U) The interactions of gallium atom spin-orbit states with silicon (100) surface are studied by isothermal scattering and by temperature programmed desorption (TPD) using laser-induced fluorescence detection. State resolved sticking coefficients are found to be unity for both spin-orbit states (2P_{1/2}, 2P_{3/2}, $\Delta E = 2.5$ kcal/mole, 10.5 kJ/mole) up to surface temperatures of 1000 K. A Redhead analysis of the state-specific TPD spectra yields essentially identical energies and pre-exponential factors for both spin orbit states. A statistical branching ratio is observed between the 2P_{1/2} and 2P_{3/2} Ga states at the peak of the TPD curves. These results may be accounted for by a rapid interconversion between the two states during the desorption. Since the spin-orbit splitting in this case is small, a rapid inter-conversion may be anticipated; however, modeling the desorption kinetics yields important features for the desorption of a two-state system. Keywords: Gallium; Reprints; Desorption; Epitaxy; Gallium; Laser probing; Silicon; Spin orbit state. (MJM)

DESCRIPTORS: (U) *ATOMS, *GALLIUM, *SILICON, *SPIN STATES, COEFFICIENTS, COMPUTER PROGRAMING, DESORPTION, DETECTION, ISOTHERMS, KINETICS, LASER INDUCED

AD-A199 239

AD-A199 239

UNCLASSIFIED

PAGE 124

EVJ00F

FLUORESCENCE, LASERS, ORBITS, RAYIOS, REPRINTS, SCATTERING, SPECTRA, SPINNING(MOTION), SPLITTING, SURFACE TEMPERATURE, TEMPERATURE, YIELD.

IDENTIFIERS: (U) PE81102F, WJAFOSR2305B1, *Silicon(100).

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 238 7/3 7/4

AD-A199 238 CONTINUED

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Basis Set Effects and the Choice of Reference Geometry
in Ab Initio Calculations of Vibrational Spectra,

IDENTIFIERS: (U) PE81102F, WUAF0SR230383, *Propene/
methylenecyclo.

88 11P

PERSONAL AUTHORS: Michalska, D.; Schaad, L. J.; Carsky, P.
; Hess, B. A., Jr.; Ewig, C. S.

CONTRACT NO. AFOSR-86-0148

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-1048

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Computational
Chemistry, v8 n5 p495-504 1988.

ABSTRACT: (U) A number of basis sets were evaluated for
the computation of ab initio theoretical vibrational
frequencies and infrared intensities. The question of
whether a theoretical vibrational spectrum should be
computed at experimental or theoretical molecular
geometries was investigated in detail. The role of the
way molecular correlation energy changes with geometry
was shown to be the determining factor. This was examined
for a series of test molecules, including several
diatomics and the polyatomic species ethylene and
methylenecyclopropane. Experimental geometries or ones
computed including electron correlation effects yield the
most accurate computed spectra for the cases studied.
Keywords: Reprints, Ab initio calculations, Propenes,
Basis sets, Vibrational spectra, Ethylradicals, Molecular
structure. (MJM)

DESCRIPTORS: (U) *ETHYLENE, *POLYATOMIC MOLECULES,
*PROPENES, *VIBRATIONAL SPECTRA, *METHYL RADICALS,
ACCURACY, CORRELATION, ELECTRONS, ENERGY, FREQUENCY,
GEOMETRY, INFRARED RADIATION, INTENSITY, MOLECULAR
PROPERTIES, MOLECULAR STRUCTURE, MOLECULES, REPRINTS,
SPECTRA, TEST AND EVALUATION, VIBRATION, YIELD.

AD-A199 238

AD-A199 238

UNCLASSIFIED

PAGE 125

E/J00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 237 12/1

AD-A199 236 20/5 9/3

NORTH CAROLINA STATE UNIV AT RALEIGH

TENNESSEE UNIV SPACE INST TULLAHOMA CENTER FOR LASER APPLICATIONS

(U) A Computational Method for General Higher Index Nonlinear Singular Systems of Differential Equations.

(U) Abel Inversion Using Transform Techniques.

DESCRIPTIVE NOTE: Rept. for Aug 87-Aug 88,

DESCRIPTIVE NOTE: Rept. for 1 Sep 87-31 Aug 88,

AUG 88 5P

88 9P

PERSONAL AUTHORS: Campbell, Stephen L.

PERSONAL AUTHORS: Keefer, Dennis R.; Smith, L. M.; Sudharsanan, S. I.

CONTRACT NO. AFOSR-87-0054

CONTRACT NO. AFOSR-86-0317

PROJECT NO. 2304

PROJECT NO. 2308

TASK NO. A1

TASK NO. A1

MONITOR: AFOSR
TR-88-1054MONITOR: AFOSR
TR-88-1060

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of IMACS World Congress on Scientific Computation, VI p178-180, n.d.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Quantitative Spectroscopy and Radiative Transfer, V39 n5 p367-373 1988.

ABSTRACT: (U) In the last few years there has been substantial progress on the numerical solutions of special classes of nonlinear singular systems of differential equations. These systems are also called differential algebraic equations (DAEs). A general numerical procedure for their solution does not currently exist. This reprint extends a general technique developed for the linear time varying singular systems $A(t)y'(t) + B(t)y(t) = f(t)$ to nonlinear systems. (kr)

DESCRIPTORS: (U) *COMPUTATIONS, *DIFFERENTIAL EQUATIONS, ALGEBRA, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, REPRINTS, SOLUTIONS(GENERAL).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

DESCRIPTORS: (U) *TRANSFORMATIONS(MATHEMATICS), MATHEMATICAL FILTERS, LASERS, NOISE, REPRINTS, PROJECTIVE TECHNIQUES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1, *Inverse problems, Abel inversion, Frequency domain.

AD-A199 237

AD-A199 236

UNCLASSIFIED

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A199 235

4/1

AD-A199 235 CONTINUED

BOSTON UNIV MA DEPT OF ELECTRICAL COMPUTER AND SYSTEMS
ENGINEERING

(U) Electromechanical Feedback Processes in the Ionosphere.

DESCRIPTIVE NOTE: Final technical rept. 1 Dec 84-31 May
88,

AUG 88 7P

PERSONAL AUTHORS: Forbes, Jeffrey M.

CONTRACT NO. AFOSR-85-0048

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-88-1048

UNCLASSIFIED REPORT

ABSTRACT: (U) The general goals were to provide a better understanding of the observed neutral and plasma structures in the upper atmosphere, and to define appropriate parameterizations for the neutral-plasma interactions governing these structures in comprehensive numerical models of the thermosphere and ionosphere. A convection model was utilized to investigate the electrodynamic coupling between the magnetosphere and thermosphere including the effects of neutral winds, and noting the change in electric fields penetrating to low latitudes due to the wind effects. A unique aspect of the study is that the high latitude convection driven winds are included self-consistently and interactively; that is, a steady state wind parameterization was derived analytically in terms of the electric potential, which is in turn included in a closed-loop calculation for the electric potential itself. An analogous study was performed for the thermosphere ionosphere system, wherein the balance height of the F layer was expressed analytically in terms of the meridional neutral wind, and the two parameters allowed to evolve self-consistently within dynamical calculations representing magnetically disturbed and quiet conditions in the thermosphere. In another series of calculations, plasma structures unique to the equatorial ionosphere were modeled analytically

AD-A199 235

AD-A199 235

UNCLASSIFIED

PAGE 127

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 902 1/1 10/4

AD-A198 901 14/2

ILLINOIS INST OF TECH CHICAGO FLUID DYNAMICS RESEARCH CENTER

ILLINOIS INST OF TECH CHICAGO FLUID DYNAMICS RESEARCH CENTER

(U) Management and Control of Separation by Unsteady and Vortical Flows.

(U) The National Diagnostic Facility under Construction.

DESCRIPTIVE NOTE: Final technical rept. Oct 84-Oct 87,

DESCRIPTIVE NOTE: Final technical rept. Nov 84-Nov 87,

JUN 88

JUN 88

PERSONAL AUTHORS: Nagib, Hassan W.; Acharya, Mukund; Reisenhofer, Patrick H.; Way, John L.; Williams, David R.

PERSONAL AUTHORS: Nagib, Hassan W.; Corke, Thomas; Nieman, Edward; Way, John L.; Kusek, Steve

CONTRACT NO. F49620-84-C-0080

CONTRACT NO. AFOSR-84-0273

PROJECT NO. 2307

PROJECT NO. 2917

TASK NO. A3

TASK NO. A1

MONITOR: AFOSR

MONITOR: AFOSR

TR-88-0745

TR-88-0746

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Management and Control of two- and three-dimensional separated flows by unsteady and/or vortical flows is investigated in a number of configurations aimed at an enhanced basic understanding of governing mechanisms. The investigations are aimed at impacting the design of future generations of aircraft with improved maneuverability for better performance and safety. Also, novel techniques are being developed for the measurement, mapping and documentation of these complex unsteady flowfields. Keywords: Separation, Unsteady flows, Vortical flows. (MUM)

ABSTRACT: (U) The ITT Fluid Dynamics Research Center is nearing completion on the construction of a flexible diagnostic wind tunnel. This national facility will become a center for research at the university level on active and passive flow management of turbulent, unsteady and three-dimensional aerodynamics at high subsonic speeds. This unique wind tunnel will fill a serious void between other current basic research facilities in this country, and its use will be open to university, government and industry scientists. The facility is designed to operate at velocities up to 500 ft/sec in a test section of 4 ft by 5 ft cross section by 40 ft long. All operations of this facility, including optimum free-spectrum settings, unsteady flow operation, cooling of the tunnel air, the positioning and motion of aerodynamic models, the setting of streamwise pressure gradient as well as three-dimensional motions of traversing mechanisms and model positions, will be controlled by digital computers. (jes)

DESCRIPTORS: (U) *FLOW, *UNSTEADY FLOW, *VORTICES, CONFIGURATIONS, CONTROL, MANEUVERABILITY, SEPARATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A3.

DESCRIPTORS: (U) *DIAGNOSIS(GENERAL), *TEST EQUIPMENT, AERODYNAMIC CHARACTERISTICS, AERODYNAMICS, AIR, CONTROL, COOLING, DIGITAL COMPUTERS, FLOW, FLUID DYNAMICS, INDUSTRIES, MANAGEMENT, MODELS, MOTION, OPERATION, PASSIVE SYSTEMS, PRESSURE GRADIENTS, RESEARCH FACILITIES.

AD-A198 902

AD-A198 901

UNCLASSIFIED

PAGE 128

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 901 CONTINUED

SCIENTISTS, SUBSONIC CHARACTERISTICS, THREE DIMENSIONAL,
TRAVERSING MECHANISMS, TUNNELS, UNIVERSITIES, UNSTEADY
FLOW, WIND TUNNELS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2917A1.

AD-A198 878 11/2.1

COLORADO STATE UNIV FORT COLLINS

(U) Sub-Micron Carbon Filaments for Optical Applications.

DESCRIPTIVE NOTE: Final rept. 15 Jul 88-14 Nov 87,

NOV 87

PERSONAL AUTHORS: Spain, Ian L.; McConica, Carol M.;
Hager, J.

CONTRACT NO. F49620-88-C-0083

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0290

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this work was to study the growth and physical properties of carbon fibers prepared by the ion-bombardment of carbon surfaces, with particular reference to optical obscuration applications. During the contract period, it was decided to include another class of carbon fibers grown by catalytic-chemical-vapor-deposition (CCVD). This initial work showed that submicron diameter filaments of high aspect ratio could be grown. (jes)

DESCRIPTORS: (U) *CARBON FIBERS, CARBON, DIAMETERS, FILAMENTS, OBSCURATION, OPTICAL PROPERTIES, PHYSICAL PROPERTIES, RATIOS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2.

AD-A198 901

AD-A198 878

UNCLASSIFIED

PAGE 125 EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 822 5/2

AD-A198 822 CONTINUED

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) Air Force Research Initiation Program. 1986 Technical Report. Volume 3.

DESCRIPTIVE NOTE: Interim Rept.,

APR 88

PERSONAL AUTHORS: Darrah, Rodney C.

CONTRACT NO. F49620-88-C-0013

PROJECT NO. 3386

TASK NO. D5

MONITOR: AFOSR

TR-88-0722

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A198 820.

ABSTRACT: (U) Mini-grant research reports of the A.F. 1986 Research Initiation Program in vol. 3 include: Use of the image algebra; Simulation studies of MICAP allocation systems for EOQ items; Computer modeling of infrared signatures; An intentional tutor; Two-dimensional flight simulation model for an aircraft with a rapidly rotating airfoil; Mission effectiveness analysis of an aircraft attacking passive targets; Synchrotron white beam topography of striations and interface breakdown of GaAs and of strain fields in Si; Complete statistical classification of natural surface roughness on gas turbine blades; Evaluation of atmospheric effects for operational tactical decision aid; Formation of a dynamic stall vortex on a pitching airfoil; Biodegradation of aqueous film forming foam components in laboratory scale microcosms; Effects of telecommunication media upon group decision making processes within a multi-team situation assessment task; Can a supervisory control simulation system assess cognitive abilities?; Effects on the BICFET of the feral distribution factor and the Al mole fraction; Warehouse layout program; Changes in perceived workload and physiological response associated with monocular versus binocular viewing conditions; Finite element analysis of thermomechanically coupled

AD-A198 822

stress and temperature fields; Simplification of H (at infinity) compensators. (edc)

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR STRIKES, AIRCRAFT, AIRFOILS, ALGEBRA, ALLOCATIONS, BINOCULARS, BIODETERIORATION, BREAKDOWN(ELECTRONIC THRESHOLD), CLASSIFICATION, COGNITION, COMPENSATORS, COMPUTERIZED SIMULATION, CONTROL SYSTEMS, COUPLING(INTERACTION), DECISION MAKING, DISTRIBUTION, DYNAMICS, FERMI SURFACES, FINITE ELEMENT ANALYSIS, FLIGHT SIMULATION, FOAM, GALLIUM ARSENIDES, GAS TURBINE BLADES, GROUP DYNAMICS, IMAGES, INFRARED SIGNATURES, INTERFACES, LABORATORIES, MEDIA, MENTAL ABILITY, MISSION PROFILES, MODELS, PASSIVE SYSTEMS, PHYSIOLOGICAL EFFECTS, PITCH(MOTION), RESPONSE(BIOLOGY), ROTATION, SCALE, SILICON, SIMULATION, STALLING, STATISTICAL ANALYSIS, STRESSES, STRIATIONS, SUPERVISION, SURFACE ROUGHNESS, TACTICAL ANALYSIS, TARGETS, TEAMS(PERSONNEL), TELECOMMUNICATIONS, THERMOMECHANICS, TEMPERATURE, TWO DIMENSIONAL, VISIBILITY, VORTICES, WAREHOUSES, WORKLOAD.

IDENTIFIERS: (U) Decision aids, PE81102F, WUAFOSR3396DS.

AD-A198 822

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 821

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UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) Air Force Research Initiation Program. 1988 Technical Report. Volume 2.

DESCRIPTIVE NOTE: Interim rept.,

APR 88

PERSONAL AUTHORS: Darrah, Rodney C.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 3398

TASK NO. D5

MONITOR: AFOSR
TR-88-0721

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 3. AD-A198 822.

ABSTRACT: (U) Mini-grant research reports of the A.F. 1986 Research Initiation Program in vol. 2 include:
Unified approach of the linear camera calibration problem;
Survival analysis of radiated animals for small sample sizes;
Optimum shape synthesis for structures undergoing plastic deformation;
Pulsed power conductors; Locally implicit method for computational aerodynamics;
Fluorescent dye binding identification of asbestos on membrane filters and in bulk materials;
Expert systems for optimal design;
Synthesis of some new energetic materials;
MBE grown Al-Cu alloy films;
Simulation for priority handling algorithms;
Neural network simulation generator, simulations of learned serial behavior, and a neural explanation of emergent communication;
Data processing and statistical analysis of in-service aircraft transparency failures;
Trajectory studies of the bimolecular reaction of H₂O/H₂O;
Development of a new finite element grid for limited area weather models;
Automatic program generation from specifications using prolong;
Novel aspects of organic electrochemistry in room temperature molten salts;
Improved distributed operating system communication protocols;
Tunable infrared to visible light conversion in rare earth and transition metal doped fluoride glasses;
Optimal

AD-A198 821

UNCLASSIFIED

PAGE 13:

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AD-A198 821 CONTINUED

structural modifications to enhance the robustness of actively controlled large flexible structures; MATRIX-based computer simulation of the cardiovascular system under +Gz stress; Adaptive grid generation techniques for transonic projectile base flow problems. (edc)

DESCRIPTORS: (U) *AIR FORCE RESEARCH, EPITAXIAL GROWTH, METAL FILMS, COPPER ALLOYS, SCHEDULING, LEARNING, TRANSITION METALS, DOPING, GLASS, FLUORIDES, COMPUTERIZED SIMULATION, HIGH ACCELERATION, BASE FLOW, ADAPTIVE SYSTEMS, AERODYNAMICS, AIRCRAFT, ALGORITHMS, ANIMALS, ASBESTOS, ATMOSPHERE MODELS, AUTOMATIC PROGRAMMING, BULK MATERIALS, CALIBRATION, CAMERAS, CARDIOVASCULAR SYSTEM, COMMUNICATION AND RADIO SYSTEMS, COMPUTATIONS, CONTROL, CONVERSION, DATA PROCESSING, ELECTRIC CONDUCTORS, ELECTROCHEMISTRY, ENERGETIC PROPERTIES, FAILURE(MECHANICS), FILTERS, FINITE ELEMENT ANALYSIS, FLEXIBLE STRUCTURES, FLUORESCENT DYES, FUSED SALTS, GENERATORS, GRIDS, HANDLING, IDENTIFICATION, INFRARED RADIATION, LIGHT, LINEARITY, MEMBRANES, MODIFICATION, MOLECULES, NEURAL NETS, OPTIMIZATION, ORGANIC CHEMISTRY, PLASTIC DEFORMATION, POWER, PULSES, RADIATION, RARE EARTH COMPOUNDS, RESPONSE, ROOM TEMPERATURE, SHAPE, SIMULATION, STATISTICAL ANALYSIS, STRUCTURAL PROPERTIES, SURVIVAL(GENERAL), SYNTHESIS, TRAJECTORIES, TRANSPARENT PANELS, TUNING, VISIBILITY, WEATHER.

IDENTIFIERS: (U) EXPERT SYSTEMS, PE81102F, WUAFOSR3398D5.

AD-A198 821

UNCLASSIFIED

AD-A198 820 5/2 DYC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 820 5/2

AD-A198 820 CONTINUED

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) Air Force Research Initiation Program. 1988 Technical Report. Volume 1.

DESCRIPTIVE NOTE: Interim report.

APR 88

PERSONAL AUTHORS: Darrah, Rodney C.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 3398

TASK NO. D5

MONITOR: AFOSR

TR-88-0720

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2 AD-A198 821.

ABSTRACT: (U) Mini-grant research reports of the A.F. 1988 Research Initiation Program in vol. 1 include: Weather forecast evaluation by decomposition of the wind field into barotropic and baroclinic components; An EPR study of the role of catalysts in the thermal decomposition of nitroaromatic compounds; Stellar scintillometer based studies of optical turbulence; Impact of cognitive styles on decision making; Feasibility study and test application of uncertainty estimates to an atmospheric dispersion model with potential utility in AF operations; Design of multivariable optimal control systems; Visualization of hydrocarbon jet diffusion flames; Infrared fluorescence and photoacoustic measurements and NO (v=2) relaxation as a function of temperature; Heat and mass transfer in a dual-latent heat packed bed thermal storage system; Long-term potentiation in interneurons in the mammalian brain; Development of image processing algorithms for AFGL ultraviolet camera and other imaging systems; Relationship between stages of motor learning and kinesthetic sensitivity; Investigation of pulsed discharges in nitrogen for plasma processing; Modeling of failure mechanisms in ceramic composites under flexural loading; Sensitivity of mesoscale wind to variations in

AD-A198 820

vegetation canopy parameters and surface properties; Effects of exercise and dobutamine on suspension hypokinesia/hypodynamia deconditioning in rats; Computer communications using knowledge based systems; Droplet size distribution measurement in a single element liquid rocket injector. (edc)

DESCRIPTORS: (U) *AIR FORCE RESEARCH, ALGORITHMS, AROMATIC COMPOUNDS, ATMOSPHERE MODELS, BRAIN, CAMERAS, CANOPIES, CATALYSTS, CATECHOLAMINES, CERAMIC MATERIALS, COGNITION, COMPOSITE MATERIALS, COMPUTER COMMUNICATIONS, DECISION MAKING, DECOMPOSITION, DIFFUSION, DISPERSIONS, DISTRIBUTION, DROPS, ESTIMATES, EXERCISE(PHYSIOLOGY), FAILURE, FEASIBILITY STUDIES, FLEXURAL PROPERTIES, FLUORESCENCE, FUEL INJECTORS, HEAT TRANSFER, HYDROCARBONS, IMAGE PROCESSING, IMAGES, INFRARED RADIATION, JET FLAMES, LEARNING, LIQUID PROPELLANT ROCKET ENGINES, MAMMALS, MASS TRANSFER, MEASUREMENT, MOTOR REACTIONS, MUSCLES, NITROGEN, NITROGEN COMPOUNDS, OPTICAL PROPERTIES, PARAMETERS, PARTICLE SIZE, PLASMAS(PHYSICS), PROCESSING, PULSES, PYROLYSIS, RATS, REDUCTION, SCINTILLATION COUNTERS, STARS, SURFACE PROPERTIES, SUSPENSION DEVICES, TEST AND EVALUATION, TURBULENCE, ULTRAVIOLET PHOTOGRAPHY, VEGETATION, WEATHER FORECASTING, WIND.

IDENTIFIERS: (U) PEB1102F, WUAFOSR3398D5.

AD-A198 820

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 792

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AD-A198 792 CONTINUED

TENNESSEE UNIV MEMPHIS DEPT OF ANATOMY AND NEUROBIOLOGY

(U) Changes in Somatosensory Responsiveness in Behaving Primates.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 85-30 Jun 88.

AUG 88

PERSONAL AUTHORS: Nelson, Randall J.

CONTRACT NO. AFOSR-85-0217

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-0891

UNCLASSIFIED REPORT

ABSTRACT: (U) The four specific goals of the research conducted were: 1) to train monkeys to perform sensory-triggered wrist movement tasks in preparation for electrophysiological recording and to study their reaction times for visually vs. vibratory-triggered movements; 2) to record from the cerebral cortex of awake, behaving monkeys during the performance of these sensory-triggered wrist movement tasks; 3) to analyze data obtained from electrophysiological and behavioral recording to better understand the occurrence of sensory gating during the execution of stereotyped behaviors; 4) to train human subjects to perform the same tasks as those require of the monkeys to determine the differences in human reaction times for hand movements made in response to visual and vibratory cues so that the human results could be compared with the monkey data. We have determined that: 1) The premovement activity that occurs in primary somatosensory cortical neurons differs in timing and magnitude, depending upon the type of sensory cue used to trigger hand movements. 2) The magnitude of the premovement activity during vibratory-cued trials is related to how responsive a given neuron is to vibratory stimuli. 3) Humans and monkeys make hand movements more quickly in response to vibratory as compared with visual go cues. Our main goal was to better understand the

AD-A198 792

AD-A198 792

UNCLASSIFIED

PAGE 133

EVJ00F

performance limitations imposed by the nervous system on subjects that are required to control devices by responding to sensory cues with appropriate corrective and/or controlled hand movements. Keywords: Changes in sensory responsiveness; Response gating; Human and primate reaction times; Visual and vibratory cues. (KT)

DESCRIPTORS: (U) *ELECTROPHYSIOLOGY, *REACTION TIME, BEHAVIOR, CEREBRAL CORTEX, CONTROL SYSTEMS, CUES(STIMULI), HUMANS, LIMITATIONS, MONKEYS, NERVE CELLS, NERVOUS SYSTEM, PRIMATES, RECORDING SYSTEMS, RESPONSE, SENSES(PHYSIOLOGY), STIMULI, VIBRATION, VISUAL PERCEPTION.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2312A2, *Somatosensory responsiveness. *Evoked response, Response gating, Visual cues, Vibratory cues.

UNCLASSIFIED

DYC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 747 8/2

AD-A198 747 CONTINUED

OKLAHOMA STATE UNIV STILLWATER DEPT OF ZOOLOGY

(U) Interaction of Hydrophobic Molecules with Heme Proteins.

activity. Thus, perturbation of the hydrophobic surface of integral proteins may also alter structure/function. Keywords: Reaction kinetics, Molecule molecule interactions, Active site, Binding site. (kt)

DESCRIPTIVE NOTE: Final rept. 1 Aug 84-30 Apr 88,

AUG 88 42P

PERSONAL AUTHORS: Harmon, W. W.

CONTRACT NO. AFOSR-84-0284

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-88-0908

DESCRIPTORS: (U) *BLOOD PROTEINS, *HYDROPHOBIC PROPERTIES, *MOLECULE MOLECULE INTERACTIONS, AMINO ACIDS, CONFORMITY, CONSERVATION, CYTOCHROME OXIDASE, ENZYMES, EVOLUTION(GENERAL), EXCHANGE, EXTERNAL FUNCTIONS, HEMOGLOBIN, INTERACTIONS, INTERFACES, INTERNAL, LIPIDS, MEMBRANES, MEMBRANES(BIOLOGY), MOLECULES, PROSTHETICS, PROTEINS, REACTION KINETICS, REGIONS, RESIDUES, SITES, SURFACES, THREE DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5, *Heme.

UNCLASSIFIED REPORT

ABSTRACT: (U) This research project investigated the effects of hydrophobic molecules on the structure and function of proteins. Proteins have hydrophobic interior regions where interaction with hydrophobic molecules may occur. The amino acid residues concerned with the active site and the binding of prosthetic groups are evolutionarily conserved. In general, the hydrophobic residues in proteins are also conserved, although not highly (i.e., a hydrophobic residue, perhaps not the same identical residue, is usually present at a certain position in the protein). This evolutionary conservation indicates the importance of the hydrophobic interior to the maintenance of the three dimensional protein structure and hence its function. Perturbation of the hydrophobic region can be expected to alter structure/function, particularly in heme proteins, where the heme prosthetic groups lies in a hydrophobic pocket or region. Proteins that are integral components of membranes have an additional hydrophobic region on the surface of the protein where interaction with the membrane lipids occurs. Integral proteins such as cytochrome oxidase, will have a hydrophobic protein interior as well as an exterior surface where 45-50 'boundary' or interfacial lipids are found. In these integral proteins, conformation and enzymatic activity are dependent on lipid; depletion or exchange of lipid by another type result in decreased

AD-A198 747

AD-A198 747

UNCLASSIFIED

PAGE 134

EVJ00F

UNCLASSIFIED

AD-A198 721 1/1 20/4 12/5 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F
AD-A198 721 CONTINUED

BOEING COMMERCIAL AIRPLANE CD SEATTLE WA

(U) Coupling Linearized Far-Field Boundary Conditions with
Nonlinear Near-Field Solutions in Transonic Flow.

DESCRIPTIVE NOTE: Final rept. 1 Jul 83-29 Feb 88,

FEB 88

PERSONAL AUTHORS: Rowe, William S.; Ehlers, F. E.

REPORT NO. D6-52895

CONTRACT NO. F49620-83-C-0118

PROJECT NO. 2302

TASK NO. 81

MONITOR: AFOSR
TR-88-0719

UNCLASSIFIED REPORT

ABSTRACT: (U) Research has been conducted to evaluate the feasibility of coupling linearized far-field solutions with near-field finite difference equations to reduce the number of unknowns and thus the computer resources required in transonic flow calculations. For two dimensional flow, changes to an existing finite difference program involved distributing sources on the grid boundary in order to obtain the proper far field outgoing wave boundary conditions on a reduced grid. Validation of the matching procedure was made for zero thickness airfoils by comparison of the results with those of the kernel function method. For airfoils with finite thickness, a criterion based on the gradient of the flowfield Mach number was developed for establishing the minimum size finite difference region necessary for accurate unsteady calculations. This approach could not be applied directly to three-dimensional flow because of the large number of variables required in the exterior solution. However, it is shown that the number of unknowns can be reduced to a practical number by using both source and doublet distributions on the boundaries, describing these distributions with low-order polynomials, and using a least squares procedure to satisfy the matching conditions across the boundaries. Solutions for

AD-A198 721

the flow over a wing of vanishing thickness were in very good agreement with results from original finite difference technique and with the kernel function method. Solutions for a wing thickness were in good agreement with results from the original finite difference technique. The pilot program used for this study is limited to rectangular wings.

DESCRIPTORS: (U) *FINITE DIFFERENCE THEORY, *TRANSONIC FLOW, *WINGS, AIRFOILS, BOUNDARIES, COMPUTATIONS, COMPUTERS, COUPLING(INTERACTION), DIFFERENCE EQUATIONS, DISTRIBUTION, FAR FIELD, FLOW FIELDS, GRIDS, KERNEL FUNCTIONS, LEAST SQUARES METHOD, LINEARITY, MACH NUMBER, MATCHING, PILOT STUDIES, POLYNOMIALS, RECTANGULAR BODIES, REDUCTION, RESOURCES, SOLUTIONS(GENERAL), THICKNESS, THREE DIMENSIONAL FLOW, TWO DIMENSIONAL FLOW, VALIDATION, VARIABLES.

IDENTIFIERS: (U) WUAFOSR2302B1, PE81102F, Rectangular wings.

AD-A198 721

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 627 20/9

AD-A198 628 11/4 11/8.1

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL
ENGINEERING AND MATERIALS SCIENCE

(U) Fundamental Processes in Partially Ionized Plasmas.

(U) Fundamentals of Interfacial Strength in Composite
Materials.DESCRIPTIVE NOTE: Final scientific rept. 1 Feb 83-31 Jan
88.

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 Jul 86-30 Sep 87.

MAY 88 153P

NOV 87 22P

PERSONAL AUTHORS: Kruger, C. W.; Mitchner, M.; Self, S. A.

PERSONAL AUTHORS: Thompson, A. W.; Bernstein, I. M.;
Voelkel, A.

CONTRACT NO. AFOSR-83-0108

PROJECT NO. 2301

REPORT NO. MEMS-ALC-11

TASK NO. B2

CONTRACT NO. AFOSR-86-0238

MONITOR: AFOSR
TR-88-0933

PROJECT NO. 2308

TASK NO. A1

UNCLASSIFIED REPORT

ABSTRACT: (U) This research is directed to three major areas: recombination in molecular plasmas, discharge effects (plasma electrode interaction) and interaction of discharges and fluid dynamics. Recombination and ionization are fundamental processes that play a role in nearly all applications and natural phenomena that involve partially ionized plasmas. Under the present program experiments have been designed and theoretical analyses conducted to obtain a better knowledge of the rates of electron recombination in the presence of molecular species. Studies were undertaken of the near-electrode region and the processes by which current is transferred in the region between a plasma and an electrode. A study of the interaction of discharges and fluid dynamics has measured the significant secondary flows and their effects caused by the interaction of a magnetic field with a current-carrying plasma.

DESCRIPTORS: (U) *PLASMAS(PHYSICS), *RECOMBINATION REACTIONS, CURRENTS, ELECTRODES, ELECTRONS, FLUID DYNAMICS, INTERACTIONS, IONIZATION, MAGNETIC FIELDS, MOLECULES, RATES, SECONDARY FLOW, THEORY.

IDENTIFIERS: (U) PB81102F, WUAFOSR230182, Partially ionized plasmas.

AD-A198 627

AD-A198 628

UNCLASSIFIED REPORT

ABSTRACT: (U) The current research period has emphasized 8061 and 7090 aluminum alloys as composite matrices, both with particulates SIC reinforcements. As in our previous work, we have found the fracture behavior to be sensitive to both process variables (in this case, different consolidation methods by the two material producers) and to metallurgical variables (in this case, degree of aging). In particular, overaging these materials lead to precipitation at the interface between the matrix and the SIC, which in turn appears to encourage initiation and growth of microvoids at those interfaces, leading to enhanced ductile fracture. (jes)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *MATRIX MATERIALS, *METALLURGY, AGING(MATERIALS), DUCTILITY, FRACTURE(MECHANICS), INTERFACES, PARTICULATES, PRECIPITATION, STRENGTH(GENERAL), VARIABLES.

IDENTIFIERS: (U) WUAFOSR2308A1.

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 601 7/4 20/5

AD-A198 601 CONTINUED

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Monolayer and Langmuir-Blodgett Multilayer Surface and Spectral Studies of Poly-3-BCMU,

88

PERSONAL AUTHORS: Biegański, J. E.; Cadenhead, D. A.; Prasad, P. N.

REPORT NO. SUNY/AB/TR-20

CONTRACT NO. F49620-87-C-0042

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0748

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Langmuir, v4 n3 p889-893 1988.

ABSTRACT: (U) Monolayer films of poly-3-BCMU are shown to form at the air-water interface, the surface pressure/area per residue (PI/A) isotherms of which exhibit a horizontal plateau indicative of a phase change occurring on compression. Langmuir-Blodgett monolayer films, have transferred while proceeding through this region, have visible absorption spectra indicating a conformational change from an amphipathic yellow to a nonamphipathic blue form having increased PI-electron conjugation. A thermodynamic analysis of the temperature dependency of the compressional onset of the plateau (PI), interpreted in terms of a corrected two-dimensional analogue of the Clapeyron equation, shows a slightly exothermic transition. A comparison shows considerable relaxation can take place at areas per residue less than 100 Sq. Angstroms. This is interpreted as reflecting the pronounced reorganization required for the highly ordered blue conformation to completely form. Multilayers of poly-3-BCMU transferred at divergent areas per residue show visible absorption spectra reflecting the different degrees of conformational order of the monolayer films from which they were fabricated. When monolayers of poly-4-BCMU and poly-3-BCMU are sandwiched, an alternating

AD-A198 601

AD-A198 601

UNCLASSIFIED

PAGE 137

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 578 12/5

AD-A198 578 CONTINUED

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES SIGNAL AND
IMAGE PROCESSING INS T

(U) Research Instrumentation for Computer Vision, Image
Understanding and Optical Computing.

DESCRIPTIVE NOTE: Final Rept. 1 Sep 86-28 Feb 88,

FEB 88 12P

PERSONAL AUTHORS: Chellappa, R.

CONTRACT NO. AFOSR-86-0316

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
YR-88-0783

UNCLASSIFIED REPORT

ABSTRACT: (U) The following equipment was purchased SUN 3/180 workstation, 2 SUN 3/110 workstation memory boards and floating point accelerators, a Microvax II dedicated host computer, TI Explorer II AI workstation. The equipment acquired has greatly improved research productivity in the projects listed by providing up-to-date hardware and software capability. The projects are very closely related and are specifically: Image Processing and Computer Vision; Optical Implementation of Neural Networks for Computer Vision; Nonlinear Optical Information Processing; and Optical Symbolic Computing. Common to all these areas of research is the need for: Extensive numerical simulation and modeling of devices, processors and systems; Computationally intensive transforming and analysis of algorithms performed on large arrays of image and other multidimensional data; Solution of optimization problems involving multidimensional nonlinear equations; Interframe processing between several arrays of image data; and Interactive display, manipulation and plotting of images and graphic representations of the results. (jnd)

DESCRIPTORS: (U) *IMAGE PROCESSING, *NEURAL NETS,
*OPTICAL PROCESSING, *ARTIFICIAL INTELLIGENCE, ALGORITHMS,
ARRAYS, COMPUTATIONS, COMPUTER PROGRAMS, COMPUTERS, DATA

AD-A198 578

AD-A198 578

UNCLASSIFIED

PAGE 138

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 576 6/4

AD-A198 576 CONTINUED

LOYOLA UNIV OF CHICAGO IL PARMLY HEARING INST

(U) Information Processing of Complex Sounds in the Anteroventral Cochlear Nucleus.

DESCRIPTIVE NOTE: Final rept. Sep 88-Mar 88,

APR 88

PERSONAL AUTHORS: Shofner, William P.

CONTRACT NO. AFOSR-86-0328

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR
TR-88-0850

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments currently in progress are designed to quantify the information in the average firing rates of cochlear nucleus neurons. Single unit responses to best frequency tone bursts are recorded, and Receiver Operating Characteristic (ROC) curves are generated from empirical spike count distributions. In order to quantify the amount of information present for an increase in discharge rate, the area under the ROC curve, $P(A)$, is computed. For a given difference in the means of two spike count distributions regular units (such as choppers) typically give larger $P(A)$ values than do some irregular units (such as choppers) typically give larger $P(A)$ values than do some irregular units (primary-like or transient chopper units). These results suggest that rate information may be enhanced in certain subsystems of the cochlear nucleus. Single unit recording experiments will be carried out in the cochlear nucleus to establish whether a rate-place representation of tones and tones in noise are preserved by the chopper units (stellate cells) of the AVCN. To obtain an objective measure of how much information is present in the average discharge rate, techniques derived from Signal Detection Theory are applied to empirical spike count distributions obtained. The overall objective was to describe the temporal and rate information present in the auditory nerve, and then investigate how the primary-like units

AD-A198 576

AD-A198 576

UNCLASSIFIED

PAGE 138

EVJ02F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 565

11/8

7/4

AD-A198 565 CONTINUED

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Electrochemistry of Polythiophene and Polybithiophene
Films in Ambient Temperature Molten Salts.

IDENTIFIERS: (U) PE61102F, WUAFDSR2303B2,
POLYBITHIOPHENE FILMS, MOLTEN SALTS.

DESCRIPTIVE NOTE: Rept. for 1 Dec 88-31 May 87.

NOV 87 10P

PERSONAL AUTHORS: Janiszewska, Laura; Osteryoung, Robert
A.

CONTRACT NO. AFOSR-87-0088

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-88-0883

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electrochemical
Society, v134 n11 p2787-2795 Nov 87.

ABSTRACT: (U) Polythiophene and polybithiophene polymer
films were deposited on platinum, tungsten, and glassy
carbon electrodes by anodic oxidation of the monomer in
ambient temperature molten salts, consisting of a mixture
of aluminum chloride and 1-methyl-3-ethyl-imidazolium
chloride. The formation reaction of polythiophene and
polybithiophene is totally irreversible. The polymer
films are conductive in the oxidized state and
nonconductive when reduced as indicated by the shape of
cyclic voltammetric curves for the polymers and for
ferrocene oxidation on electrodes covered by different
thicknesses of polymer. Keywords: Electroactive
conducting polymers, Chloroaluminates, Melts, Reprints.
(JES)

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *THIOPHENES,
ALUMINUM COMPOUNDS, ANODIC COATINGS, CHLORIDES,
DEPOSITION, ELECTRODES, FERROGENES, FUSED SALTS, GLASSY
CARBON, MELTS, MIXTURES, OXIDATION, PLATINUM, POLYMERIC
FILMS, POLYMERS, REPRINTS, RESPONSE, TEMPERATURE,
THICKNESS, TUNGSTEN.

AD-A198 565

AD-A198 565

UNCLASSIFIED

PAGE 140

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 564

7/3

AD-A198 564 CONTINUED

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Dialkylamino Phosphorus Metal Carbonyls. 4. Novel Phosphorus-Bridging Carbonyl Derivatives and Triphosphine Derivatives from Reactions of Tetracarbonylferrate(-II) with (Dialkylamino) dichlorophosphines 1-4.

DESCRIPTORS: (U) *CARBONYL COMPOUNDS, *ORGANIC PHOSPHORUS COMPOUNDS, *ORGANOMETALLIC COMPOUNDS, AMINES, ALKYL RADICALS, CHEMICAL REACTIONS, IRON COMPOUNDS, CHLORINE COMPOUNDS, PHOSPHINE, REPRINTS.

IDENTIFIERS: (U) PE61102F, WJAFOSR2303B2.

DESCRIPTIVE NOTE: Journal article.

87

14P

PERSONAL AUTHORS: King, R. B.; Wu, F. -J.; Holt, E. M.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0881

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Americal Chemical Society, v108 n25 p7764-7775 1987.

ABSTRACT: (U) Reactions of $R_2NPCl_2(R=isopropyl, cyclohexyl)$ with $Na_2Fe(CO)_4$ give orange $(R_2NP)_2CoFe_2(CO)_8$ as the major product in diethyl ether solution and orange $(R_2NP)_3Fe_2(CO)_6$ as the major product in tetrahydrofuran solution. X-ray diffraction on (1-Pr $_2$ NP) $_2CoFe_2(CO)_8$ (monoclinic, P2 sub 1/n; a = 10.197 (3), b = 31.403 (13), c = 9.170 (3) A; beta = 112.18 (2) deg; Z = 4) indicates a structure in which an iron-iron bond (2.803 (2) A) in an $Fe_2(CO)_8$ unit is bridged by two phosphorus atoms and these two phosphorus atoms are bridged by one of the seven carbonyl groups, thereby suggesting a novel migration of a carbonyl group from iron to phosphorus. X-ray diffraction on (1-Pr $_2$ NP) $_3Fe_2(CO)_6$ (monoclinic, P2 sub 1/n; a = 11.554 (2), b = 14.294 (6), c = 20.405 (4) A; beta = 90.96 deg; Z = 4) indicates an $Fe_2(CO)_6$ unit (Fe-Fe = 2.602 (2) A) bridged by a triphosphine chain. Keywords: Iron; Metal carbonyls, Phosphorus-bridging carbonyl derivatives; Triphosphine derivatives; Tetracarbonylferrate; Dialkylamino-phosphorus derivatives; Reprints. (AW).

AD-A198 564

AD-A198 564

UNCLASSIFIED

PAGE 141

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 563 7/3 7/2

AD-A198 562 7/4

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Dialkylamino Phosphorus Metal Carbonyls. 1.
Mononuclear Derivatives from Reactions of
Bis(diisopropylamino)phosphine with Metal Carbonyls.

(U) Electrochemistry of Molybdenum Chloride Dimers in a
Basic Ambient-Temperature Molten Salt.

88 9P

DESCRIPTIVE NOTE: Journal article,

PERSONAL AUTHORS: Carlin, Richard T.; Osteryoung, Robert
A.

86 19P

PERSONAL AUTHORS: King, R. B.; Wu, W. K.

CONTRACT NO. AFOSR-87-0088

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B2

TASK NO. B2

MONITOR: AFOSR
TR-88-0872

MONITOR: AFOSR
TR-88-0882

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v25 n14
p2384-2389 1986.

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v27 n8
p1482-1488 1988.

ABSTRACT: (U) Bis(diisopropylamino)phosphine, (i-Pr₂N)
2PH, has recently become readily available through the
LiAlH₄ reduction of (i-Pr₂N)₂PCl. Metal carbonyl
complexes of (i-Pr₂N)₂PH are of interest because they
contain potentially reactive phosphorus-hydrogen and
phosphorus nitrogen bonds. This paper describes a number
of mononuclear (i-Pr₂N)₂PH metal carbonyl complexes as
well as the cleavage of one or, in one case, both
phosphorus-nitrogen bonds in such complexes with hydrogen
halides to give the corresponding metal carbonyl
complexes of the ligands i-Pr₂NP(H)X (X = Cl, Br) and
Br₂PH. Reprints, Organic phosphorus compounds. (mjm)

ABSTRACT: (U) The molybdenum (III) dimers Mo₂C18(3-) and
Mo₂C18H(3-) and the molybdenum(II) dimer Mo₂C18(4-) have
been studied in the basic ambient-temperature molten salt
AICl₃-1-methyl-3-ethylimidazolium chloride (ImCl) by
employing electrochemistry and visible spectroscopy. Both
Mo(III) dimers are reduced to the Mo(II) dimer at
approximately the same potential in a single
irreversible, two-electron step. The quadruply bonded
dimer, Mo₂C18(4-), undergoes a quasi-reversible, one-
electron oxidation to Mo₂C18(3-) and is further oxidized
to Mo₂C19(3-) in an irreversible, one-electron step at a
more anodic potential. The hydride dimer Mo₂C18H(3-)
undergoes an irreversible, two-electron oxidation that
produces Mo₂C19(3-) and a proton. The electrochemical and
chemical interconversions of the dimers are summarized.

DESCRIPTORS: (U) *METAL CARBONYLS, *METAL COMPLEXES,
*ORGANIC PHOSPHORUS COMPOUNDS, *PHOSPHINE, BONDED JOINTS,
CLEAVAGE, HYDROGEN COMPOUNDS, NITROGEN, NITROGEN
COMPOUNDS, PHOSPHORUS, REPRINTS, LITHIUM HYDRIDE,
ALUMINUM, CHLORINE, BROMINE.

IDENTIFIERS: (U) PE61102F, WJAFOSR2303B2, *Phosphine/
bis(diisopropylamino).

AD-A198 563

UNCLASSIFIED

PAGE 142

EVJ00F

AD-A198 562

DESCRIPTORS: (U) *CHLORIDES, *DIMERS, *ELECTROCHEMISTRY,
*MOLYBDENUM COMPOUNDS, ANODES, CHEMICAL BONDS, ELECTRON
TRANSITIONS, OXIDATION REDUCTION REACTIONS, REPRINTS,
SPECTROSCOPY, VISIBLE SPECTRA, VOLTAGE, ALUMINATES, FUSED
SALTS, IRREVERSIBLE PROCESSES.

Keywords: Chloroaluminates; Electrochemistry; Molybdenum
dimers; Reprints. (AW).

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 562 CONTINUED

AD-A198 561 7/3 7/2

IDENTIFIERS: (U) Chloroaluminates, PE61102F,
WJAFOSR230382.

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Dialkylamino Phosphorus Metal Carbonyls. 6. Chemistry
of (Tris(diisopropylamino)triphosphine)diiron
Hexacarbonyl Derivatives Including the Synthesis and
Structure of Heterometallic Derivatives 1-4.

DESCRIPTIVE NOTE: Journal article.

88 8P

PERSONAL AUTHORS: King, R. B.; Wu, F. -J.; Holt, E. M.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0868

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v7 n7
p1241-1246 1988.

ABSTRACT: (U) Recent results from our laboratory have shown that the reaction of $i\text{-Pr}_2\text{NPCl}_2$ with $\text{Na}_2\text{Fe}(\text{CO})_2$ in tetrahydrofuran solution provides a source for the tris(diisopropylamino)triphosphine)hexacarbonyldiiron complex ($i\text{-Pr}_2\text{NP})_3\text{Fe}_2(\text{CO})_6$ in approx 30% yield, thereby making this complex readily available in approx 30-g quantities. This complex is of interest because the rigid $\text{P}_2\text{Fe}_2(\text{CO})_6$ framework holds the center phosphorous atom in an unusual environment as indicated by the unusual low-field chemical shift relative to those of phosphorous atoms in other systems not involved in multiple bonding. Furthermore, the selective acid cleavage of the diisopropylamino group bonded to the center phosphorous atom without disturbing the diisopropylamino groups bonded to the two terminal phosphorous atoms of the triphosphine chain makes ($i\text{-Pr}_2\text{NP})_3\text{Fe}(\text{CO})_6$ a versatile precursor to other (triphosphine) hexacarbonyldiiron derivatives, mainly species of the general formula ($i\text{-Pr}_2\text{NP})_2\text{P}(\text{X})\text{Fe}_2(\text{CO})_6$. This paper presents details of our studies on (triphosphine) hexacarbonyldiiron complexes of this and

AD-A198 562

AD-A198 561

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 561 CONTINUED

related types. Our work in this area includes a study of the following two different approaches to bonding a second metal carbonyl moiety, not necessarily an iron carbonyl moiety, to the center phosphorous atom in such triphosphine complexes. Reprints, Organic phosphorous compounds. (mjm)

DESCRIPTORS: (U) *ORGANIC COMPOUNDS, *PHOSPHORUS, *PHOSPHINE, ATOMS, BONDING, CHEMICAL SHIFTS, CHEMISTRY, FIELD CONDITIONS, FORMULATIONS, FURANS, HYDROXYL RADICALS, REPRINTS, SOLUTIONS(GENERAL), SYNTHESIS(CHEMISTRY).

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B2, *Phosphine/tris(dilisopropylamino)tr

AD-A198 560 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Synthesis of Trifluorosilyl Organometallic Complexes from Trifluorosilyl Radicals and Metal Atoms.

87 7P

PERSONAL AUTHORS: Lagow, Richard J.; Bierschenk, Thomas R.; Guerra, Miguel A.; Juchlike, Timothy J.; Larson, Steven B.

CONTRACT NO. AFOSR-87-0016, SAFOSR-82-0197

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0867

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Americal Chemical Society, v109 n16 p4855-4860 1987.

ABSTRACT: (U) Trifluorosilyl radicals generated in a radio frequency glow discharge of hexafluorodisilane were reacted with metal atoms to give the first homoleptic trifluorosilyl metal compounds. bis(trifluorosilyl) tellurium, tris(trifluorosilyl)bismuth, tris(trifluorosilyl)antimony, and bis(trifluorosilyl)mercury were formed in moderate yields by cocondensation of tellurium, bismuth, antimony, and mercury with trifluorosilyl radicals (SiF_3) on a cryogenic surface. In a similar manner trifluorosilyl complexes containing additional ligands were also prepared. For example, we have successfully prepared bis(trifluorosilyl)-tris(trimethylphosphine)nickel, (n8-toluene)bis(trifluorosilyl)nickel, bis(trifluorosilyl)-bis(trimethylphosphine)palladium, bis(trifluorosilyl)-cadmium-glyme, and bis(trifluorosilyl)-zinc-2-pyridine. Keywords: Trifluorosilyl radicals, Organometallics, Metal atoms, Silanes, Organic fluorine compounds, Reprints. (mjm)

DESCRIPTORS: (U) *ANTIMONY, *MERCURY, *ORGANOMETALLIC COMPOUNDS, *SILANES, *TELLURIUM, ATOMS, BISMUTH, CRYOGENICS, FLUORINE COMPOUNDS, GLOW DISCHARGES, LIGANDS, METALS, ORGANIC COMPOUNDS, RADIOFREQUENCY, REPRINTS,

AD-A198 561

AD-A198 560

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJOOF

AD-A198 580 CONTINUED

AD-A198 559 7/4 7/2

SURFACES, SYNTHESIS(CHEMISTRY).

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

IDENTIFIERS: (U) PEG1102F, WJAFOSR2303B2, *S11Y1/
trifluoro.

(U) Electrochemical and Spectroscopic Studies of 1,4-
Benzoquinone in Ambient Temperature Chloroaluminate
Ionic Liquids.

FEB 88 8P

PERSONAL AUTHORS: Uribe, Francisco A.; Osteryoung, Robert
A.

CONTRACT NO. AFOSR-87-0088

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0871

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electrochemical
Society, v135 n2 p378-381 Feb 88.

ABSTRACT: (U) The chemical, electrochemical, and
spectroscopic properties of 1,4-benzoquinone (Q) have
been studied in the aluminum chloride:1-ethyl-3-
methylimidazolium chloride (ImCl) ionic liquid. In basic
melts (AlCl₃:ImCl mole ratio <1.0), fast scan voltammetry
(up to 1000 Vc) shows that Q reduces to Q in a fast two-
electron step, probably followed by solvation of the
dianion. Infrared and visible spectroscopic data, and
electrochemical measurements show that Q reacts with Cl
in basic melts producing the dianion of
monochlorohydroquinone. Q shows no electrochemical
response in acidic melts (1.2:1AlCl₃1ImCl). However, it
reacts with the solvent and eventually generates HCl
which is electrochemically detected at a Pt electrode.
Keywords: Voltammetry, Chloroaluminates, Infra-red
spectroscopy, Reprints. (jes)

DESCRIPTORS: (U) *ALUMINUM COMPOUNDS, *ELECTROCHEMISTRY,
ACIDS, CHLORIDES, ELECTRON TRANSITIONS, HIGH RATE,
INFRARED SPECTROSCOPY, MEASUREMENT, MELTS, REPRINTS,
RESPONSE, SCANNING, SPECTROSCOPY, VISIBLE SPECTRA,
VOLTAMMETRY, ORGANIC CHEMISTRY.

AD-A198 580

AD-A198 559

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 559 CONTINUED

AD-A198 558 14/2

IDENTIFIERS: (U) PE61102F, WUAFOSR230382, BEZOQUINONE,
CHLOROALUMINATE.

PRINCETON UNIV NJ DEPT OF CHEMISTRY

(U) Reliability of Complex Devices in Random Environments.

87 21P

PERSONAL AUTHORS: Cinlar, E.; Ozakici, S.

CONTRACT NO. AFOSR-87-0050

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0793

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Probability in the
Engineering and Informational Sciences, v1 p97-115 1987.

ABSTRACT: (U) The lifetimes of the components of a device depend on each other because of their joint dependence on the environmental conditions. The authors intrinsic age processes, one for each component, to handle such dependence. The data required can be obtained by experiments under controlled laboratory conditions. The computations needed for randomly varying conditions are recursive and can be used for making decisions regarding maintenance and replacement. Keywords: Reprints, Maintenance. (KR)

DESCRIPTORS: (U) *LIFE EXPECTANCY(SERVICE LIFE),
*RELIABILITY, COMPUTATIONS, CONTROL, ENVIRONMENTS,
LABORATORIES, MAINTENANCE, REPLACEMENT, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A198 559

AD-A198 558

UNCLASSIFIED

PAGE 148

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 557 12/4

AD-A198 508 11/2.1

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER
ENGINEERING

MASSACHUSETTS INST OF TECH CAMBRIDGE CENTER FOR
MATERIALS SCIENCE AND ENGINEE RING

(U) Immersion and Immersion by Nonsingular Feedback of a
Discrete-Time Nonlinear System Into a Linear System,

(U) Intercalation and Electrical Properties of Highly
Ordered Graphite Fibers.

MAY 88 7P

DESCRIPTIVE NOTE: Rept. for 1 Sep 87-30 Apr 88.

PERSONAL AUTHORS: Lee, Hong-Gi; Marcus, Steven I.

88 8P

CONTRACT NO. AFOSR-88-0029

PERSONAL AUTHORS: Endo, Morinobu; Yamanashi, Hidenori;
Sudou, Atsusi; Dresselhaus, W. S.

PROJECT NO. 2304

CONTRACT NO. F48629-85-C-0147

TASK NO. A1

PROJECT NO. 2303

MONITOR: AFOSR
TR-88-0892

TASK NO. A3

UNCLASSIFIED REPORT

MONITOR: AFOSR
TR-88-0712

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Automatic Control v33 n5 p475-482 May 88.

UNCLASSIFIED REPORT

ABSTRACT: (U) Consider an analytic discrete-time
nonlinear system. Necessary and sufficient conditions for
immersion of the system into a linear system are given.
Also, define local immersion by nonsingular feedback into
a linear system and give necessary and sufficient
conditions for this problem. Finally, a similar approach
can also be applied to continuous-time affine nonlinear
systems. Keywords: Reprints, Control theory, Immersion,
Nonlinear systems, Linearization. (jhd)

SUPPLEMENTARY NOTE: Pub. in International Colloquium on
Layered Compounds p189-173 1988.

ABSTRACT: (U) Vapor-grown carbon fibers have been
obtained by pyrolysis of hydrocarbon such as benzene and
methane with catalytic effect of ultra-fine metal
particles. Two different methods have been established
for successful formation of the fibers; substrate method
and aerosol system as shown in Fig. 1. By the substrate
method, thick and long fibers can be grown. By aerosol
system, where the catalytic particles are floating in the
reaction chamber, very thin in diameter and less than
several mm in length have been effectively produced.
These carbon fibers from gas phase have a high degree of
preferred orientation and exhibit a high graphitizability
enough for intercalation. These intercalated vapor-grown
carbon fibers show high electrical conductivity and
mechanical performances. Keywords: Intercalated fibers,
Vapor grown graphite fibers, Reprints, Conductivity,
Environmental reactions, Resistivity, Graphite fibers.
(jes)

DESCRIPTORS: (U) *CONTROL THEORY, *NONLINEAR SYSTEMS,
DISCRETE DISTRIBUTION, IMMERSION, LINEAR SYSTEMS,
LINEARITY, REPRINTS, TIME.

IDENTIFIERS: (U) PEG1102F, WJAFOSR2304A1.

DESCRIPTORS: (U) *CARBON FIBERS, AEROSOLS, BENZENE,
CATALYSIS, CATALYTIC CRACKING, CHAMBERS, CONDUCTIVITY,

AD-A198 557

AD-A198 508

UNCLASSIFIED

PAGE 147

FVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 508 CONTINUED

ELECTRICAL CONDUCTIVITY, ELECTRICAL PROPERTIES, ENVIRONMENTS, FIBERS, GRAPHITE, HIGH RATE, HYDROCARBONS, METALS, METHANE, PARTICLES, PYROLYSIS, REPRINTS, RESISTANCE, SUBSTRATES, THICKNESS, ULTRAFINES, VAPOR PHASES, VAPORS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3.

AD-A198 507 7/5 7/3

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY
(U) Photochemistry of Benzocyclobutene.

88 5P

PERSONAL AUTHORS: Turro, N. J.; Zhang, Z.; Trahanovsky, M. S.; Cho, C.-H.

CONTRACT NO. AFOSR-84-0040

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-88-0897

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tetrahedron Letters, v29 p2543-2546 1988.

ABSTRACT: (U) Photolysis of benzocyclobutene (1) in pentane solution at 254 nm yields, 1,1-dihydropentalene (2) and 1,5-dihydropentalene (3) as the major isomeric products; formation of 2 and 3 is consistent with a prebenzvalene carbene rearrangement mechanism. Reprints. (aw)

DESCRIPTORS: (U) *PHOTOLYSIS, *CYCLOBUTENES, *BENZENE COMPOUNDS, ISOMERS, PENTANES, REPRINTS.

IDENTIFIERS: (U) *Benzocyclobutene, PE81102F, WUAFOSR230382.

UNCLASSIFIED

AD-A198 505 7/2 7/4 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 505 CONTINUED

ion angular distribution).

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) Observation of Molecular Rotors on Surfaces by ESDIAD
(Electron Stimulated Desorption Ion Angular
Distribution): Studies of PF₃ and NH₃ Chemisorption on
Ni Surfaces,

88

PERSONAL AUTHORS: Yates, J. T., Jr.; Alvey, M. D.;
Dresser, M. J.; Lanzillo, A.-M.; Uram, K. J.

CONTRACT NO. AFOSR-88-0107

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-88-0694

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Desorption Induced by
Electronic Transitions (DIET III), Surface Science 13
p100-108 1988.

ABSTRACT: (U) We demonstrate in this paper that ESDIAD
(electron stimulated desorption ion angular distribution)
can give detailed information about the dynamical
behavior of chemisorbed species and about the
intermolecular forces which modify the dynamical motions
of these species. Traditionally, spectroscopic methods
have been used to study the dynamical behavior of
molecules in gases, liquids, and in the adsorbed layer.
In studies of the adsorbed molecular rotors N₂, HD, and
D₂, EELS has been used to observe transitions between
essentially free rotational states present on Cu(100).
For CO hydrogen-bonded to OH groups on SiO₂ surfaces,
rotational wings have been observed by IR. Phosphorus
trifluoride, Nitrogen trihydride, Reprints. (mjm)

DESCRIPTORS: (U) *DYNAMICS, *FLUORIDES, *PHOSPHORUS,
*NITROGEN COMPOUNDS, *HYDRIDES, *NICKEL, ADSORPTION,
GASES, LAYERS, MOLECULES, MOTION, REPRINTS, ROTATION,
ROTORS, SPECTROSCOPY, WINGS.

IDENTIFIERS: (U) *EsdIad(Electron simulated desorption

AD-A198 505

AD-A198 505

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 501 7/2

AD-A198 501 CONTINUED

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Studies of L-DOPA and Related Compounds Adsorbed from Aqueous Solutions at Pt(100) and Pt(111): Electron Energy Loss Spectroscopy, Auger Spectroscopy, and Electrochemistry.

88 13P

PERSONAL AUTHORS: Stern, Donald A.; Salaita, Ghaleb N.; Lu, Frank; McCargar, James W.; Batina, Nikola

CONTRACT NO. AFOSR-88-0200

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-88-0703

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Langmuir, V4 n3 p711-722 1988.

ABSTRACT: (U) Adsorption of L-DOPA and a series of other amino acids and related compounds from aqueous solutions at well-defined Pt(111) and Pt(100) single-crystal surfaces has been studied: 3-(3,4-dihydroxyphenyl)-L-alanine (DOPA), L-tyrosine (TYR), L-cysteine (CYS), L-phenylalanine (PHE), L-alanine (ALA), dopamine (DA), catechol (CT), and (3,4-dihydroxyphenyl) acetic acid (DOPAC). Packing densities (moles adsorbed per unit area) were measured for each compound by means of quantitative Auger spectroscopy; two independent Auger spectroscopic methods were employed: one based upon measurement of elemental Auger signals from the adsorbed layer and the other upon measurement of the attenuation of the Pt Auger signal by the adsorbed layer. Packing densities of DOPA, TYR, DA, CT, and DOPAC indicate adsorption with the aromatic ring attached parallel to the surface. In contrast, CYS is adsorbed through the sulfur atom, while ALA and PHE are attached to the surface through their amino acid moieties. Vibrational spectra of the adsorbed layer formed from each of these compounds were obtained by means of electron energy-loss spectroscopy (EELS) and were compared with the infrared spectra of the parent compounds in KBr. Keywords: L-DOPA, Pt(100), Pt(111).

AD-A198 501

UNCLASSIFIED

PAGE 150

EVJ00F

EELS, Auger spectroscopy, Electrochemistry, Platinum.
(mjm)

DESCRIPTORS: (U) *ADSORPTION, *AMINO ACIDS, *DOPAMINE, *PLATINUM, *ALANINES, *TYROSINE, *CYSTEINE, ACETIC ACID, AROMATIC COMPOUNDS, ATOMS, ATTACHMENT, ATTENUATION, AUGER ELECTRON SPECTROSCOPY, ELECTROCHEMISTRY, ELECTRON ENERGY, ELECTRON SPECTROSCOPY, INFRARED SPECTRA, LAYERS, LOSSES, MEASUREMENT, PACKING DENSITY, RINGS, SOLUTIONS(MIXTURES), SULFUR, SURFACES, VIBRATIONAL SPECTRA, WATER.

IDENTIFIERS: (U) PEB1102F, WUAFDSR2303A1, *L-dopa.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 500 11/6.1 21/5

AD-A198 492 7/3 7/8

GEORGIA INST OF TECH ATLANTA SCHOOL OF MATERIALS
ENGINEERING

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Cyclic Deformation, Damage, and Effects of Environment
in the N13Al Ordered Alloy at Elevated Temperatures.

(U) Polysilylated Unsaturated Molecules.

DESCRIPTIVE NOTE: Annual rept. 1 May 87-1 May 88,

DESCRIPTIVE NOTE: Final rept. 1 Sep 83-29 Feb 88,

MAY 88 8P

JUL 88 12P

PERSONAL AUTHORS: Antolovich, Stephen D.

PERSONAL AUTHORS: Jones, Paul R.

CONTRACT NO. AFOSR-87-0182

CONTRACT NO. AFOSR-83-0244

PROJECT NO. 2308

PROJECT NO. 2303

TASK NO. A1

TASK NO. B2

MONITOR: AFOSR

MONITOR: AFOSR

TR-88-0578

TR-88-0750

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) A basic program is defined to investigate cyclic deformation, damage accumulation, and fatigue crack propagation (FCP) in the ordered N13Al system as affected by composition, temperature, and environment. While this class of ordered alloys shows great promise for elevated temperature applications in jet and rocket engines, problems of brittleness and damage by hostile environments have been encountered in monotonic tensile deformation. The basic mechanisms of cyclic deformation and fatigue crack propagation have not been fully investigated; yet must be understood if these materials are to be used in advanced applications. Nickel alloys. (Jes)

DESCRIPTORS: (U) *NICKEL ALLOYS, *ROCKET ENGINES, *JET ENGINES, ADVERSE CONDITIONS, BRITTLENESS, CRACK PROPAGATION, CYCLES, DAMAGE, DEFORMATION, FATIGUE(MECHANICS), HIGH TEMPERATURE.

IDENTIFIERS: (U) PE81102F, WJAFOSR2306A1.

ABSTRACT: (U) A series of functionalized disilyl-substituted acetylenes, cyclic and linear polysilylpolycacetylenes and cyclic polysiloxypolycacetylenes were synthesized and characterized. The disilylacetylenes served as precursors to disilylated benzenes which were isomerized to their thermodynamically most stable meta isomers using molecular iodine as the catalyst. The studies on the oligomeric polysilylpolycacetylenes and the polysiloxypolycacetylenes included 1) the determination of their spectral and non-linear optical properties, 2) photochemical polymerization, 3) formation of complexes with transition metal carbonyls, and 4) studies of nucleophilic cleavage reactions aimed at determining suitable reagents and conditions for potential ring-opening polymerization reactions. (aw)

DESCRIPTORS: (U) *ACETYLENES, *POLYMERS, *SILICON COMPOUNDS, BENZENE, CATALYSTS, CLEAVAGE, IODINE, NUCLEOPHILIC REACTIONS, OPTICAL PROPERTIES, PHOTOCHEMICAL REACTIONS, POLYMERIZATION, SPECTRA, TRANSITION METAL COMPOUNDS, CYCLIC COMPOUNDS, METAL CARBONYLS, UNSATURATED HYDROCARBONS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B2.

AD-A198 500

AD-A198 492

UNCLASSIFIED

PAGE 151

EVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 488 7/5 7/3

AD-A198 487 6/5 5/8

OREGON UNIV EUGENE DEPT OF CHEMISTRY

NEW YORK UNIV N Y

(U) Photochemistry of Organometallic Halide Complexes.
Mechanisms for the Formation of Ionic Products.

88

7P

(U) Perceptual Factors in Workload: A Neuromagnetic Study.
DESCRIPTIVE NOTE: Final technical rept. 1 Jan 85-31 Dec 87.

PERSONAL AUTHORS: Pan, Xiong; Philbin, Cecelia E.;
Castellani, Michael P.; Tyler, David R.

JUN 88 25P

PERSONAL AUTHORS: Kaufman, Lloyd; Williamson, Samuel J.

CONTRACT NO. AFOSR-88-0081

CONTRACT NO. F49620-85-K-0004

PROJECT NO. 2303

PROJECT NO. 2313

TASK NO. B2

TASK NO. A4

MONITOR: AFOSR
TR-88-0751

MONITOR: AFOSR

TR-88-0881

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v27 p871-876 1988.

ABSTRACT: (U) The photochemical reactions of the $Mn(CO)_5(X)(X = \text{Chlorine, Bromine, Iodine})$, $CpMo(CO)_3(X)(X = \text{Cl, I})$, and $CpFe(CO)_2I$ complexes with various ligands were investigated with an emphasis on determining how ionic products form in these reactions. Two pathways account for the formation of ionic products: (1) M-X heterolysis and (2) metal-metal bonded dimer formation followed by subsequent disproportionation. Keywords: Electron complexes, Photochemistry, Organometallic halide complexes, Manganese compounds, Carbonyl compounds, Molybdenum compounds, Iron compounds, Reprints. (aw)

DESCRIPTORS: (U) *HALIDES, *ORGANOMETALLIC COMPOUNDS, *PHOTOCHEMICAL REACTIONS, *IONS, BROMINE, CARBONYL COMPOUNDS, DISPROPORTIONATION, ELECTRONS, IODINE, IRON COMPOUNDS, LIGANDS, MANGANESE COMPOUNDS, REPRINTS, DIMERS.

IDENTIFIERS: (U) Heterolysis, WUAFOSR2303B2, PE81102F.

AD-A198 488

AD-A198 487

UNCLASSIFIED

PAGE 152

EVJ00F

ABSTRACT: (U) This final report includes descriptions of substantive experimental studies of neural phenomena related to attention and auditory perception. It also describes efforts to enhance the superconducting instruments and other devices needed for the rapid and accurate accumulation of neuromagnetic data, and advances made in techniques for calibrating these instruments and for analyzing neuromagnetic data. The substantive experiments included a major study of the magnetic N100 phenomena and its sources and how they are affected by selective attention. Its relationship to the electrical N100 is considered, and required future research described. Also, work on the magnetic P300 phenomenon is described. This work confirmed earlier studies showing that the equivalent current dipole source is located in or near the hippocampal formation. The localization of multiple auditory sources is described. Improvements in instrumentation include the installation of a new gantry for purposes of evaluation, the design of a novel device for quantifying positions in magnetic resonance images, and the development of a graphics program for depicting a current dipole in the heads of subjects are also described. New methods for calibrating multisensor systems were developed, and the details are provided in the report. Finally, an opportunity arose during the course of this project to locate a very small metallic

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 487 CONTINUED

object accidentally embedded in the back of a human patient. This allowed us to obtain surgical verification of magnetic methods for locating sources. The predicted position was accurate within two millimeters. Keywords: Selective attention, Neural activity, Magnetic localization.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, *ATTENTION, *NEUROPHYSIOLOGY, *MAGNETOENCEPHALOGRAMS, DIPOLES, EXPERIMENTAL DATA, GANTRIES, GRAPHICS, HEARING, HUMANS, IMAGES, INSTRUMENTATION, MAGNETIC FIELDS, MAGNETIC RESONANCE, MULTISENSORS, NERVOUS SYSTEM, NEURAL NETS, PATIENTS, PERCEPTION, SOURCES, SUPERCONDUCTORS, WORKLOAD.

IDENTIFIERS: (U) WJAFOSR2313A4, PE81102F.

AD-A198 484 9/3

CALIFORNIA UNIV BERKELEY DEPT OF CHEMISTRY

(U) Transient Behaviors in Chemical Reactions: Nanosecond Infrared Spectroscopy. Chemically Pumped Visible and Near-IR Lasers.

DESCRIPTIVE NOTE: Final rept. Nov 86-Oct 87,

JUN 88 5P

PERSONAL AUTHORS: Pimentel, George C.

CONTRACT NO. AFOSR-87-0044

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR
TR-88-0862

UNCLASSIFIED REPORT

ABSTRACT: (U) An excimer laser with pulse duration of 28 ns FWHM and average power at 248 nm of 530 mJ per pulse was purchased and used as a photolysis source to accompany an existing nanosecond infrared spectrometer. With this system, transient molecular species with lifetimes as short as ten nanoseconds can be investigated. Gaseous CF₃ was photolyzed to produce CF₃ radicals whose infrared spectra around 1250 wavenumbers were taken at selected delay times. At very short delays highly vibrationally excited radicals are found, and a measure of vibrational relaxation rates can be made. Final report, AFOSR-87-0044, 22 Jun 88, 'Transient Behaviors in Chemical Reactions: Nanosecond Infrared Spectroscopy. Chemically Pumped Visible and Near-IR Lasers'. Carbon trifluoride. (MJM).

DESCRIPTORS: (U) *CARBON, *EXCIMERS, *FLUORIDES, *INFRARED SPECTRA, *INFRARED SPECTROSCOPY, *LASERS, BEHAVIOR, CHEMICAL RADICALS, CHEMICAL REACTIONS, DELAY, INFRARED RADIATION, MOLECULES, NEAR INFRARED RADIATION, PHOTOLYSIS, RATES, RELAXATION, SHORT RANGE(TIME), SOURCES, SPECTROMETERS, TIME, TRANSIENTS, VIBRATION.

IDENTIFIERS: (U) WJAFOSR2917A2, PE81102F, *Carbon trifluoride.

AD-A198 487

AD-A198 484

UNCLASSIFIED

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 481 7/5 1983

AD-A198 480 20/12 9/1

HUGHES RESEARCH LABS MALIBU CA

GTE LABS INC WALTHAM MA

(U) Ionization Rates Relevant to Laser Cooling of Hydrogen.

(U) Transport and Junction Physics of Semiconductor-Metal Eutectic Composites.

DESCRIPTIVE NOTE: Final rept. 1 Aug 87-31 Jan 88,

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Mar 88,

JUN 88 51P

JUN 88 104P

PERSONAL AUTHORS: Turley, R. S.

PERSONAL AUTHORS: Ditchek, B.; Gustafson, J.

CONTRACT NO. F49620-87-C-0083

CONTRACT NO. F49620-88-G-0034

PROJECT NO. 2301

PROJECT NO. 2301

TASK NO. A7

TASK NO. A7

MONITOR: AFOSR
TR-88-0833MONITOR: AFOSR
TR-88-0834

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser cooling of atomic hydrogen has practical importance in a wide variety of applications ranging from relativistic neutral particle beam weapons to atomic clocks and exotic fuels. A laser beam suitable for atomic hydrogen cooling needs to be high intensity, narrowband, coherent, and broadly tunable in the region around Lyman-alpha (1216 Å). We have produced a source meeting these criteria. We studied, characterized, and optimized this source for conditions important to laser cooling. In this introductory section, we will discuss the physics and potential practical applications of laser cooling and tunable VUV sources. These will be followed by an introduction to the specific results obtained during the six months of this contract. Keywords: Atomic beams. (AM).

DESCRIPTORS: (U) *HYDROGEN, *PHOTOCHEMICAL REACTIONS, LASER APPLICATIONS, COOLING, LASER BEAMS, TUNABLE LASERS, ULTRAVIOLET LASERS, ATOMIC BEAMS.

IDENTIFIERS: (U) WJAFOSR2301A7, PE81102F.

ABSTRACT: (U) An investigation of the transport and junction physics of Si-TaSi₂ semiconductor-metal eutectic composites has demonstrated the potential use of this class of materials in highpower switching. Following the development of single-crystal matrix Si-TaSi₂ crystals, eutectic diodes utilizing the in situ junctions were fabricated and analyzed using current-voltage, capacitance-voltage, and electron-beam-induced current techniques. Studies demonstrated nearly ideal diode behavior, a Schottky barrier height of 0.62 eV, and a means of measuring the extent of the depletion zones and the carrier concentration of the semiconductor matrix. An analysis based on a comparison of the EBIC-determined carrier concentration with the Hall carrier concentration resulted in a measure of the effect of the depletion zones on composite resistivity. Building on the foundation provided by this analysis, the first eutectic composite transistors were demonstrated. These devices confirmed that current flow can be controlled by pinching off Si channels between TaSi₂ rods. Furthermore, testing at high voltages indicated that the eutectic devices are resistant to avalanche breakdown. Devices have been built that block 600 V, three times the value for a conventional planar device in a wafer of the same carrier concentration. Keywords: Solid state switching, Electron beam induced current, Eutectic composites, Depletion

AD-A198 481

AD-A198 480

UNCLASSIFIED

PAGE 154

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 480 CONTINUED

AD-A198 474 21/2

zones. (jhd)

CALIFORNIA UNIV DAVIS

DESCRIPTORS: (U) *EUTECTIC COMPOSITES, *SWITCHES, *SOLID STATE ELECTRONICS, CHARGE CARRIERS, DEPLETION, SEMICONDUCTOR DIODES, ELECTRIC CURRENT, ELECTRON BEAMS, EUTECTICS, SILICON, HALL EFFECT, HEIGHT, HIGH VOLTAGE, JUNCTIONS, PLANAR STRUCTURES, ELECTRICAL RESISTANCE, SCHOTTKY BARRIER DEVICES, SILICIDES, SWITCHING, TRANSISTORS, TANTALUM COMPOUNDS, AVALANCHE EFFECT(ELECTRONICS).

(U) Aerodynamic and Kinetic Processes in Flames.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 87-29 Feb 88.

MAY 88 4P

PERSONAL AUTHORS: Law, Chung K.

CONTRACT NO. AFOSR-85-0147

IDENTIFIERS: (U) WUAFOSR2301A7, PE81102F.

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0900

UNCLASSIFIED REPORT

ABSTRACT: (U) The flame response in realistic situations is governed by the detailed kinetics of chemical reactions, the diffusion of heat and mass, and the aerodynamic processes of stretching, turbulence, and large-scale flow nonuniformity. During the reporting period good progress was made in the areas of turbulent flame propagation, soot formation in diffusion flames, and experimental and numerical determination of the laminar flame speeds of methane/air mixtures under reduced and elevated pressures. Keywords: Flames, Chemical kinetics, Soot formation. (mjm)

DESCRIPTORS: (U) *AIR, *FLAMES, *METHANE, *REACTION KINETICS, *SOOT, AERODYNAMICS, CHEMICAL REACTIONS, DIFFUSION, FLAME PROPAGATION, FLOW, HEAT, HIGH PRESSURE, LAMINAR FLOW, MIXTURES, NUMERICAL ANALYSIS, REDUCTION, RESPONSE, TURBULENCE, VELOCITY.

IDENTIFIERS: (U) WUAFOSR2308A2, PE81102F.

AD-A198 480

AD-A198 474

UNCLASSIFIED

PAGE 155

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 473 8/4

AD-A198 473 CONTINUED

CALIFORNIA UNIV IRVINE

IDENTIFIERS: (U) WUAFOSR2312A2, PE61102F, *Calpain.

(U) Synaptic Plasticity and Memory Function.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 87-30 Nov 88.

MAY 88 6P

PERSONAL AUTHORS: Lynch, Gary

CONTRACT NO. AFOSR-86-0009

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-0889

UNCLASSIFIED REPORT

ABSTRACT: (U) Research was conducted to test the hypothesis that activation of the calcium-dependent protease, calpain, is involved in the induction of long-term potentiation (LTP) of synaptic transmission and memory storage in the mammalian brain. Evidence indicates that naturally-occurring patterns of synaptic activity can induce LTP by activating an NMDA receptor that allows postsynaptic influx of calcium. Activation of NMDA receptors induces a calcium-dependent proteolysis of spectrin, a calpain substrate; both calpain and spectrin are present in dendritic spines. Both a calpain inhibitor and a NMDA receptor antagonist have been found to interfere with spatial and olfactory learning. Calpain-mediated spectrin degradation occurs in vivo after various treatments, studies of simple cell types suggest that this mechanism may produce structural changes similar to those which accompany LTP. Keywords: Learning, Memory, Long term Potentiation, Calpain brain spectrin, Olfactory learning. (mjw)

DESCRIPTORS: (U) *BRAIN, *DENDRITIC STRUCTURE, *SYNAPSE, *MEMORY(PSYCHOLOGY), ACTIVATION, CELLS, DEGRADATION, FUNCTIONS, HYPOTHESES, IN VIVO ANALYSIS, INDUCTION SYSTEMS, LEARNING, LONG RANGE(TIME), MAMMALS, PATTERNS, PLASTIC PROPERTIES, SMELL, SPATIAL DISTRIBUTION, SPINAL COLUMN, STORAGE, STRUCTURAL PROPERTIES, SUBSTRATES, TRANSMITTANCE.

AD-A198 473

AD-A198 473

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 472 23/2 3/8

AD-A198 472 CONTINUED

UNIVERSITY OF SOUTH FLORIDA TAMPA DEPT OF COMPUTER
SCIENCE AND ENGINEERING

DIMENSIONAL.

IDENTIFIERS: (U) WUAFOSR2304A9, PE81102F.

(U) A 3-D Object Recognition System Using Aspect Graphs.

DESCRIPTIVE NOTE: Final rept. 15 Jul 87-14 Jul 88.

88 8P

PERSONAL AUTHORS: Bowyer, Kevin; Stewman, John; Stark,
Louise; Eggert, David

CONTRACT NO. AFOSR-87-0318

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-88-0789

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes a prototype 3-D object recognition system composed of three major sections; 1) an object representation module, 2) a feature extraction and matching module, and 3) a recognition control strategy module. The object representation module uses an implementation of a newly developed algorithm for the construction of perspective projection aspect graphs of convex polyhedra. The feature extraction and matching module implements a new method of using Fourier Descriptors to characterize the complete 2-D projection of an object. The recognition control strategy module uses the aspect graph object representation to control the application of a constrained optimization algorithm. The system is implemented in C on a SUN workstation, and some simple recognition experiments have been carried out to demonstrate the validity of the overall concept. The limitations of the system suggest several important avenues for future research. Keywords: Three dimensional, Two dimensional. (sdw)

DESCRIPTORS: (U) *GRAPHS, *RECOGNITION, *THREE DIMENSIONAL, ALGORITHMS, CONTROL, FOURIER ANALYSIS, INDEX TERMS, LIMITATIONS, MATCHING, MODULAR CONSTRUCTION, OPTIMIZATION, STATIONS, STRATEGY, SUN, WORK, TWO

AD-A198 472

AD-A198 472

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 471 CONTINUED

AD-A198 471 6/4 6/1

COLORADO STATE UNIV FORT COLLINS DEPT OF PHYSIOLOGY AND
BIOPHYSICS

IDENTIFIERS: (U) WUAFOSR2312A2, PE81102F, Adrenal
medulla, *Chromaffin cells, Monoclonal antibodies.

(U) Biochemical Mechanisms controlling Bioactivity of
Adrenal Chromaffin Cells.

DESCRIPTIVE NOTE: Final rept. Apr 88-May 88.

JUN 88 7P

PERSONAL AUTHORS: Vulliamis, P. R.

CONTRACT NO. AFOSR-88-0117

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-0898

UNCLASSIFIED REPORT

ABSTRACT: (U) This project has examined the biochemical mechanisms regulating the response of the rat adrenal medulla and chromaffin tissue. The responsiveness of the tissue will change depending upon the treatment that the animal has received and the time after the treatment. The alteration in reactivity appears to be correlated with changes in tissue levels of the catecholamine neurotransmitters. Tissues that demonstrate altered reactivity have profound morphological changes that return to control with the return of normal reactivity. Additional biochemical factors that may regulate reactivity are currently being examined in a variety of model systems of the chromaffin cell. Keywords: Adrenal gland, Chromaffin cells, Phosphorylation, Stress, Molecular mechanisms, Monoclonal antibodies. (kt)

DESCRIPTORS: (U) *ADRENAL GLANDS, *BIOCHEMISTRY, ADRENAL MEDULLA HORMONES, ANTIBODIES, CATECHOLAMINES, CLONES, GLANDS, MODELS, MOLECULAR PROPERTIES, MORPHOLOGY (BIOLOGY), NEUROMUSCULAR TRANSMISSION, PHOSPHORYLATION, RATS, REACTIVITIES, ADRENAL GLANDS, ADRENAL MEDULLA HORMONES, TISSUES (BIOLOGY), ANTIBODIES, BIOCHEMISTRY, CATECHOLAMINES, CLONES, GLANDS, MODELS, MOLECULAR PROPERTIES, MORPHOLOGY, NEUROMUSCULAR TRANSMISSION, PHOSPHORYLATION, RATS, REACTIVITIES.

AD-A198 471

AD-A198 471

UNCLASSIFIED

PAGE 156

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 470 6/4 5/8

AD-A198 470 CONTINUED

DALHOUSIE UNIV HALIFAX (NOVA SCOTIA)

(U) Visual Sensitivities and Discriminations and Their
Roles in Aviation.

MOTION, NERVE CELLS, OPTICAL IMAGES,
PERCEPTION(PSYCHOLOGY), PILOTS, POSITION(LOCATION)
PRECISION, PRIMATES, RODS, SENSITIVITY, SKILLS, SPATIAL
DISTRIBUTION, VISION, AVIATION PERSONNEL, DISCRIMINATION,
PERFORMANCE(HUMAN).

DESCRIPTIVE NOTE: Final rept. 15 Mar 88-14 Sep 87,

SEP 87 35P

IDENTIFIERS: (U) Blindness.

PERSONAL AUTHORS: Regan, David

CONTRACT NO. AFOSR-88-0101

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-88-0907

UNCLASSIFIED REPORT

ABSTRACT: (U) Of 8 normally-sighted subjects, 3 had areas of the visual field that were 'blind' to oscillating disparity (motion in depth) within the central 10 deg of vision. These stereomotion-blind areas had normal sensitivity for relative position in depth (i.e. normal stereoaquity) and normal sensitivity for front-selective sensory blindness, vergence eye movements could not be driven from within the stereomotion-blind areas, but conjugate eye movements could be driven. Vernier acuity for camouflaged bars defined by relative motion is approximately the same as vernier acuity for comparable bars defined by brightness contrast, even though receptive fields for detecting objects by motion alone are very large and sluggish. This may help to explain why helicopter pilots can make precise spatial judgements in slow low-level flight. A book has been completed that attempts to link evoked electric and magnetic fields of the human brain with human perception and cognition and with the properties of single neurons in primate brain. Keywords: Vision; Visual flying skills; Visual assessment; Motion perception; Stereo; Contrast sensitivity. (sdw)

DESCRIPTORS: (U) *EYE MOVEMENTS, *VISUAL PERCEPTION, VISUAL ACUITY, BRAIN BRIGHTNESS, CAMOUFLAGE, COGNITION, CONTRAST, ELECTRIC FIELDS, FLIGHT, HELICOPTERS, JUDGEMENT(PSYCHOLOGY), LOW ALTITUDE, MAGNETIC FIELDS,

AD-A198 470

AD-A198 470

UNCLASSIFIED

PAGE 159

EVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 485 CONTINUED

STEVENS INST OF TECH HOBOKEN NJ

(U) Mega-Amp Opening Switch with Nested Electrodes/Pulsed Generator of Ion and Deuteron Beams.

DESCRIPTIVE NOTE: Annual Rept. (Final) 1 Jun 88-30 Jun 87.

JUL 87 39P

PERSONAL AUTHORS: Nardi, V.

REPORT NO. SIT-AFOSR-N-88-08.87-1

CONTRACT NO. AFOSR-84-0228

PROJECT NO. 2201

TASK NO. 07

MONITOR: AFOSR
TR-88-0802

UNCLASSIFIED REPORT

ABSTRACT: (U) The use of a plasma focus as a mega-amp opening switch has been demonstrated by two modes of operation: (a) Single shot mode; (b) Repetitive Mode with a repetition rate of 0.1-1-1 MHz. The peak current in (a) was about 0.6 MA (from a 3 kJ capacitor bank at 18 kV) and in (b) about 0.2 MA (from a 40 kJ pulse forming network at about 40 kV). A voltage multiplication by a factor somewhat > 7 was observed during the 0.1 us opening stage in (a), and by a factor somewhat > 2.4 in (b). The use of field distortion elements (FDE) in the interelectrode gap indicates that the neutron yield (from D-D fusion reactions; deuterium filling of the discharge chamber) increased by a factor 10 as compared to the yield of the same system operating at the same energy level and under the same voltage and filling-pressure conditions but without field distortion elements. Misfirings of the plasma focus machine are also virtually eliminated by using FDE at the coaxial electrode breech. The tests (based on about 10000 shots and five plasma focus machines) demonstrated that a sizable amount of nuclear reactions with high-Z nuclei (C,N) are induced by the MeV D(+) ions which are accelerated and trapped in the pinch when entered in the filling gas D2+1-15% of carbon (or nitrogen) atoms. The observed reaction yield

AD-A198 485

AD-A198 485

UNCLASSIFIED

PAGE 160

EVJ00F

for high-Z nuclei is increased by suitable FDE's and is about 3% of the D-D fusion reaction yield. The neutron yield Y provides for all shots a good quantitative estimate of the performance of the plasma focus as an opening switch, i.e., Y is strongly correlated with the drop of the electrode current during the 'opening' stage. (JHD)

DESCRIPTORS: (U) *PULSE GENERATORS, *ION BEAMS, *VACUUM SWITCHES, BREECH MECHANISMS, CARBON, CHAMBERS, CLUSTERING, COAXIAL CONFIGURATIONS, DEUTERIUM, DISTORTION, ELECTRIC CURRENT, ELECTRODES, ENERGY LEVELS, ESTIMATES, FILLING, FOCUSING, ION BEAMS, MULTIPLICATION, NETWORKS, NEUTRONS, NITROGEN, NUCLEAR REACTIONS, OPENING(PROCESS), OPERATION, PEAK POWER, PLASMAS(PHYSICS), VOLTAGE, YIELD.

IDENTIFIERS: (U) PE81102F, WUAFOSR220107, Plasma switches, Plasma focus, Ion cluster beams.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 463 4/1

AD-A198 463 CONTINUED

MICHIGAN UNIV ANN ARBOR SPACE PHYSICS RESEARCH LAB

Atmospheric physics, Atmospheric motion, Optical preprocessing, Near infrared radiation, Hydroxyl radicals. (edc)

(U) Investigations of the Dynamics and Thermodynamics of the Mesosphere and Upper Thermosphere at the Polar Regions.

DESCRIPTIVE NOTE: Final rept. 1 Apr 87-31 Mar 88,

JUN 88

PERSONAL AUTHORS: Hernandez, G.

CONTRACT NO. AFOSR-87-0174

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-88-0905

DESCRIPTORS: (U) *MESOSPHERE, *THERMOSPHERE, *SPECTROMETERS, POLAR REGIONS, THERMODYNAMICS, ALASKA, CONVECTION(ATMOSPHERIC), TELEMETER SYSTEMS, ATMOSPHERIC PHYSICS, ATMOSPHERIC MOTION, PREPROCESSING, HYDROXYL RADICALS, WIND, ATMOSPHERIC TEMPERATURE, MODULATORS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2, IMF(Interplanetary Magnetic Fields), Optical preprocessing, DEM(Double Etalon Modulators).

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Washington Univ., Seattle. Graduate Program in Geophysics.

ABSTRACT: (U) The instrumentation at the Poker Flat (Alaska) field site has been made operational in teleautonomous mode. This application of telescope principles has allowed long-wire operation of the multiple-beam spectrometer at the field site, and makes it possible to efficiently obtain further observations of the dynamics and thermodynamics of the upper thermosphere. These observations have been used to show the lowest latitude at which the y-component of the IMF(Interplanetary Magnetic Field) distorts the classical two-cell convection cell in the upper thermosphere. The first simultaneous measurements of the dynamics and thermodynamics of the polar mesosphere show large fluctuations in the wind field and seem to be associated with temperature fluctuations. At this time, we were able to monitor a mesospheric event, characterized by a large decrease of the emission rate of the emissions from this region. A double-etalon modulator (DEM) has been theoretically developed and its properties have been experimentally confirmed. The DEM is a compensated device with nearly 100 times the luminosity of presently available spectrometers. Keywords: Telemeter systems.

AD-A198 463

AD-A198 463

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 462 12/9

AD-A198 462 CONTINUED

MISSOURI UNIV-ST LOUIS DEPT OF PHYSICS

1988. (rh)

(U) Fundamental Quantum 1/f Noise in Ultrasmall Semiconductor Devices and their Optimal Design Principles.

DESCRIPTORS: (U) *CROSS CORRELATION, *MICROELECTRONICS, *QUANTUM ELECTRODYNAMICS, *SEMICONDUCTOR DEVICES, COEFFICIENTS, DETECTORS, DIFFUSION COEFFICIENT, ELECTRON TUBES, KINETICS, OPTIMIZATION, PARTICLES, SEMICONDUCTOR DIODES, SOLIDS, SPECTRA, TRANSISTORS.

DESCRIPTIVE NOTE: Annual Rept. no. 3, 1 May 85-30 May 88,

MAY 88 88P

IDENTIFIERS: (U) PEB102F, WUAFOSR2305C1.

PERSONAL AUTHORS: Handel, Peter H.

CONTRACT NO. AFOSR-85-0130

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-88-0804

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Annual report no. 1 dated May 88, AD-A174 512.

ABSTRACT: (U) During this period I have extended the second-quantized derivation of quantum 1/f noise shown in the Second Annual Report to the general case of N particles present in the final state. I also have derived the quantum 1/f cross correlations and the corresponding cross-correlation spectra, which are important for the calculation of quantum 1/f noise in kinetic coefficients such as the mobility and the diffusion coefficient of the current carriers in solids. In order to better explain the foundations of quantum 1/f theory, I have given a derivation of the quantum 1/f Schrodinger fields from quantum electrodynamics with the use of coherent states. Finally, I have given a direct derivation of the quantum 1/f effect in time and space. In terms of applications, a quantum 1/f noise study of MIS detectors was performed. Experimentally, with the collaboration of the group of Prof. A van der Ziel, an excellent experimental verification of quantum 1/f theory was performed on semiconductor diodes, transistors and vacuum tubes, and a review article on the results of the experimental application and verification of my theory was published by A. van der Ziel in the Proceedings of IEEE in March

AD-A198 462

AD-A198 462

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 461 7/3

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF CHEMISTRY

(U) Frank Elastic Constants and Leslie-Ericksen Viscosity Coefficients of Nematic Solutions of a Rodlike Polymer.

87 11P

PERSONAL AUTHORS: Se, Kazumori; Berry, G. C.

CONTRACT NO. F49820-85-C-0140

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0890

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Molecular Crystals and Liquid Crystals, v153, 133 10p 1987.

ABSTRACT: (U) The formation of a monodomain nematic liquid crystal with a solution of the rodlike poly(1,4-phenylene-2,6-benzobisthiazole) will be described, along with the results of elastic and quasi-elastic light scattering on the oriented solution. The latter are analyzed to give the ratios $KS/KT = 15.8$ and $K8/KT = 7.3$ for the Frank elastic constants and $nS/nT = 0.86$ and $nS/nT = 0.14$ for the Leslie-Ericksen viscosities. These are compared with theoretical models and with results observed for the shear stress and the flow birefringence in steady flow. Reprints, Thiazoles. (mjm)

DESCRIPTORS: (U) *BIREFRINGENCE, *LIQUID CRYSTALS, *THIAZOLES, *POLYMERS, CONSTANTS, ELASTIC PROPERTIES, FLOW, MODELS, REPRINTS, SHEAR STRESSES, SOLUTIONS(GENERAL), STEADY FLOW.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, *Thiazole/benzo2,6-1,4-phenylene.

AD-A198 461

AD-A198 455 20/4 7/6

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF CHEMISTRY

(U) Rheological Studies on Blends of Rodlike and Flexible Chain Polymers.

88 5P

PERSONAL AUTHORS: Kim, G.; Sullivan, V.; Berry, G.

CONTRACT NO. F49820-85-C-0140

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0889

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in ANTEC p990-993 1988.

ABSTRACT: (U) Rheological studies are reported on blends of rodlike and flexible chain polymers in solution. All data are for composition for which the components are fully miscible. A principal effect is a substantial enhancement that may occur in the viscosity η_0 at low shear rate. The reduced distribution of relaxation times normalized for the change in rheology is relatively independent of the concentration of the flexible chain polymer. The data are discussed in the context of a single-integral constitutive relation of the BZK type. Reprints. (jes)

DESCRIPTORS: (U) *POLYMERS, *RHEOLOGY, CHAINS, DISTRIBUTION, FLEXIBLE MATERIALS, LOW RATE, MIXTURES, REDUCTION, RELAXATION, REPRINTS, SHEAR PROPERTIES, VISCOSITY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, *RODLIKE POLYMERS, CHAIN POLYMERS.

AD-A198 455

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 454 CONTINUED

AD-A198 454 7/6 20/6

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF CHEMISTRY

(U) Nematic Solutions of Rodlike Polymers Light Scattering from Nematic Solutions with Complex Texture and Phase Separation in Poor Solvents.

87 14P

PERSONAL AUTHORS: Se, Kallend; Berry, G. C.

CONTRACT NO. F49620-84-C-0140

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0891

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in American Chemical Society,
v10 p129-151 1987.

ABSTRACT: (U) Light scattering studies are reported for solutions of the rodlike poly(4,4-phenylene-2,6-benzobisthiazole), PBT, in methane sulfonic acid, MSA. Static and dynamic scattering are reported on a nematic phase with a smooth texture, and the polarized and depolarized static scattering is given during a heating and cooling cycle over the nematic-isotropic-nematic transition. The annealing of a nematic mottled texture formed on cooling the isotropic phase is followed by static scattering. The effect of absorbed water on the nematic phase is reported, including the following features which appear in order of the amount of water absorbed: transformation to a yellow isotropic state with the rodlike chains in an aggregated supramolecular structure; formation of a yellow birefringent state, probably through a spinodal phase separation. Reprints. (jes)

DESCRIPTORS: (U) *LIGHT SCATTERING, *POLYMERS, ANNEALING, BIREFRINGENCE, COOLING, CYCLES, DYNAMICS, ISOTROPISM, LIQUID CRYSTALS, LIQUID PHASES, METHANE, PHASE, POLARIZATION, REPRINTS, SCATTERING, SEPARATION, SOLUTIONS(GENERAL), SOLVENTS, STATICS, SULFONIC ACIDS, TEXTURE, WATER.

AD-A198 454

AD-A198 454

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303A3, NEMATIC SOLUTIONS, SPINODAL PHASE SEPARATION.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 453 20/5

AD-A198 453 CONTINUED

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB
OF CHEMICAL PHYSICS

(U) (1+1) Resonant Enhanced Multiphoton Ionization via the
A 2 Sigma + State of NO: Ionic Rotational Branching
Ratios and Their Intensity Dependence.

FEB 88 7P

PERSONAL AUTHORS: Rudolph, H.; Dixit, S. N.; McKay, V.;
Huo, W. M.

REPORT NO. CONTRIB-7850

CONTRACT NO. DE-FG03-87-ER0513, SAFOSR-87-0039

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0927

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v88
n3 p1518-1521, 1 Feb 88.

ABSTRACT: (U) Recent high resolution photoelectron spectroscopic studies of the (1+1) resonant enhanced multiphoton ionization (REMPI) of NO via the O-O transition of the A-X bond (gamma band) have shown a pronounced Delta N = 0 signal Delta N = N sub (+) - N sub (-) and smaller, but measurable, Delta N = + or - 2 peaks. The excitation was assigned to be via an R (21.5) line, with no further specification. Ab initio calculations of the rotational branching ratios are performed for the four possible R(21.5) transitions, namely, the rotationally clean R21 and R22, and the mixed R12 + Q22 and R11 + Q21 branches. We find the mixed R12 + Q22(21.5) branch to agree best with the observed photoelectron spectrum collected parallel to the polarization vector of the light. The discrepancy is larger for detection perpendicular to the polarization. To understand this difference, we have assessed the influence of laser intensity and polarization contamination on the branching ratios and photoelectron angular distributions. Reprints. (jhd)

DESCRIPTORS: (U) *PHOTOELECTRONS, *RESONANCE RADIATION, *ELECTRON SPECTROSCOPY, *NITROGEN OXIDES, ANGLES, CONTAMINATION, DETECTION, DISTRIBUTION, INTENSITY, LASERS, PHOTOIONIZATION, POLARIZATION, REPRINTS, SPECTRA.

IDENTIFIERS: (U) PE81102F, WUAFDSR2303B3, *Photoelectron spectroscopy.

AD-A198 453

AD-A198 453

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 452 13/12

AD-A198 451 7/2

CALIFORNIA UNIV DAVIS DEPT OF MECHANICAL ENGINEERING

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Structure and Propagation of Turbulent Premixed Flames Stabilized in a Stagnation Flow.

(U) Removal of Protons from Ambient-Temperature Chloroaluminate Ionic Liquids.

86 7P

NOV 87 3P

PERSONAL AUTHORS: Cho, P.; Law, C. K.; Hertzberg, J. R.; Cheng, R. K.

PERSONAL AUTHORS: Zawodzinski, Thomas A., Jr.; Carlin, Richard T.; Osteryoung, Robert A.

CONTRACT NO. DE-AC03-78-SF00098, SAFOSR-85-0147

CONTRACT NO. AFOSR-87-0088

PROJECT NO. 2308

PROJECT NO. 2303

TASK NO. A2

TASK NO. 82

MONITOR: AFOSR
TR-86-0888MONITOR: AFOSR
TR-88-0884

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Symposium (International) on Combustion (21st), p1473-1493-1499 1986.

SUPPLEMENTARY NOTE: Pub. in Analytical Chemistry, v59 n21 p2839-2840, 1 Nov 87.

ABSTRACT: (U) Turbulence statistics in premixed methane/air flames stabilized by a stagnation plate have been measured using the two-component laser Doppler velocimetry technique. Experimental conditions cover equivalence ratios of 0.67 to 1.16, incident turbulence intensities of 0.1 to 0.7 w/s, and global stretch rates of 100 to 230 sec. Results on turbulence statistics show that in crossing the flame the increase in fluctuation is more pronounced in the normal component while the Reynolds stress remains almost zero, and that the velocity joint probability density function is bimodal for rich flames and mono-modal for lean flames. Keywords: Reprints, Turbulent flame, Stagnation flame. (jes)

DESCRIPTORS: (U) *FLAMES, FLOW, GLOBAL, INTENSITY, MIXING, MOMENTUM TRANSFER, RATES, REPRINTS, STABILIZATION, STAGNATION, STATISTICS, STRESSES, TURBULENCE, SAFETY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2, STAGNATION FLAME.

DESCRIPTORS: (U) *CHLORIDES, *PROTONS, ALUMINUM OXIDES, BONDED JOINTS, CHEMISTRY, DIMERS, IMPURITIES, MELTS, MOLYBDENUM, OXIDATION, QUANTITY, RANGE (EXTREMES), REMOVAL, REPRINTS, SOLVENTS, WATER, WORKSHOPS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2.

AD-A198 452

AD-A198 451

UNCLASSIFIED

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 451 CONTINUED

AD-A198 450 13/12

*CHLOROALUMINATE, *IONIC SOLUTIONS.

CALIFORNIA UNIV DAVIS DEPT OF MECHANICAL ENGINEERING

(U) Propagation and Extinction of Stretched Premixed
Flames,

88 7P

PERSONAL AUTHORS: Law, C. K.; Zhu, D. L.; Yu, G.

CONTRACT NO. DE-FG03-84-ER13274, SAFOSR-85-0147

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0887

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Symposium (International) on
Combustion (21st), p1418-1426 1986.

ABSTRACT: (U) By using the symmetrical counterflow flame configuration and LDV mapping of the velocity profile, we have accurately determined for methane/air and propane/air mixtures their flame speeds as a function of the equivalence ratio and stretch, as well as the stretch rates and the associated flame speeds at the state of extinction. These data are expected to be quantitatively useful for the modeling of more complex flame and combustor phenomena. Results further show that for these mixtures the flame speed mostly increases linearly with increasing stretch, that the flame speed is finite at the state of extinction, and that the extinction limits for nearly adiabatic, stretchless, and planar flames appear to correspond to the flammability limits of the respective mixtures. Implications of the presents results on the concept of flammability limits are also discussed. Keywords: Flames, Flame speeds, Stretched flames, Flame extinction, Reprints. (jes)

DESCRIPTORS: (U) *FLAMES, *FLAMMABILITY, AIR, COMBUSTORS, CONFIGURATIONS, EXTINCTION, FLOW, LIMITATIONS, METHANE, MIXTURES, PLANAR STRUCTURES, PROFILES, PROPANE, RATES, RATIOS, REPRINTS, SYMMETRY, VELOCITY.

IDENTIFIERS: (U) PE61102F, WJAFOSR2308A2, STRETCHED

AD-A198 451

AD-A198 450

UNCLASSIFIED

PAGE 167 EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 450

CONTINUED

FLAMES.

AD-A198 443

12/3

PRINCETON UNIV NJ PROGRAM IN STATISTICS AND OPERATIONS
RESEARCH

(U) Sunset over Brownian.

88

16P

PERSONAL AUTHORS: Cinlar, Erhan

CONTRACT NO. AFOSR-87-0050

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0759

UNCLASSIFIED REPORT

ABSTRACT: (U) Consider a Brownian motion with a downward drift of rate a . Its maximum over all time has the exponential distribution with parameter $2a$. Our aim is to study this maximum as a stochastic process indexed by a . That process is related to the convex majorant of the standard Brownian motion and, through the latter, to a Poisson random measure. This connection is exploited to obtain various distributional results. The results are of interest in queueing theory. Keywords: Brownian motion, Convex majorant, Poisson random measures, Stochastic geometry, Storage allocation. (jhd)

DESCRIPTORS: (U) *BROWNIAN MOTION, ALLOCATIONS, DISTRIBUTION FUNCTIONS, DRIFT, EXPONENTIAL FUNCTIONS, GEOMETRY, POISSON DENSITY FUNCTIONS, QUEUEING THEORY, RATES, STOCHASTIC PROCESSES, STORAGE, TIME.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5, Convex majorant.

AD-A198 450

AD-A198 443

UNCLASSIFIED

PAGE 168

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 421

7/2

SUNFLOWER ARMY AMMUNITION PLANT LAWRENCE KANS

(U) MBE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.

DESCRIPTIVE NOTE: Semiannual technical rept..

JUN 87

63P

PERSONAL AUTHORS: Faurie, Jean-Pierre

CONTRACT NO. F49620-87-C-0021

MONITOR: AFOSR
TR-88-0913

UNCLASSIFIED REPORT

ABSTRACT: (U) Here we report on growth and characterization of high quality HgCdTe grown on CdTe, CdZnTe, CdTeSi and GaAs substrate. A p-type layer grown on a two-inch diameter GaAs (100) substrate exhibiting an excellent uniformity in composition has also been grown. Extrinsic dopants such as In, As, Sb and Li have been investigated and heterojunctions have been grown in situ. We report also on the incorporation of mercury in CdTe layers during the growth of HgTe-CdTe superlattices. Keywords: Mercury cadmium tellurides, Gallium arsenides, Zinc. (mjm)

DESCRIPTORS: (U) *CADMIUM TELLURIDES, *GALLIUM ARSENIDES, *MERCURY COMPOUNDS, *PROCESSING, *ZINC COMPOUNDS, DIAMETERS, ELECTRONIC EQUIPMENT, GROWTH(GENERAL), LAYERS, MERCURY, P TYPE SEMICONDUCTORS, REPORTS, SUBSTRATES.

IDENTIFIERS: (U) PE81102F.

AD-A198 421

UNCLASSIFIED

AD-A198 420

14/2

ILLINOIS UNIV AT URBANA LASER AIDED MATERIALS PROCESSING LAB

(U) Thermal Analysis System (DSC, TGA, TMA) for Oxidation and Phase Transformation Studies of Alloys with Metastable Phase.

DESCRIPTIVE NOTE: Final rept. 1 Oct 88-30 Nov 87.

JUN 88

18P

PERSONAL AUTHORS: Mazumder, J.; Kar, A.; Sircar, S.; Ribaud, C.; Subramanian, R.

CONTRACT NO. AFOSR-87-0022

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-88-0849

UNCLASSIFIED REPORT

ABSTRACT: (U) The Perkin Elmer Thermal Analysis System Consists of various individual units like the Differential Thermal Analyzer (DTA), Differential Scanning Calorimeter (DSC), Thermogravimetric Analyzer (TGA) and the Thermomechanical Analyzer (TMA). Two controllers, two dedicated computers, one graphics plotter and one microbalance make up the entire package. The system was installed in November 1986 and was first put into operation the early part of 1987. (MJM).

DESCRIPTORS: (U) *ANALYZERS, *THERMAL ANALYSIS, *THERMOGRAVIMETRIC ANALYSIS, *THERMOMECHANICS, ALLOYS, CALORIMETERS, COMPUTERS, GRAPHICS, OXIDATION, PHASE STUDIES, PHASE TRANSFORMATIONS, PLOTTERS, SCANNING.

IDENTIFIERS: (U) PE81102F, WUAFOSR2917A3.

AD-A198 420

PAGE 169

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 409 7/2

AD-A198 408 12/1

NORTH CAROLINA STATE UNIV AT RALEIGH DEPT OF ELECTRICAL
AND COMPUTER ENGINEERING

TEXAS UNIV AT AUSTIN

(U) Defect Reduction in Epitaxial Growth Using
Superlattice Buffer Layers.

(U) Optimum acceleration factors for iterative solutions
of linear and non-linear systems.

DESCRIPTIVE NOTE: Final rept. 1 Apr 85-31 Mar 88,

DESCRIPTIVE NOTE: Final rept. 1 Dec 84-31 Mar 88,

JUL 88 69P

MAR 88

PERSONAL AUTHORS: Bedalov, S. M.

PERSONAL AUTHORS: Young, David M., Jr

CONTRACT NO. AFOSR-85-0200

CONTRACT NO. AFOSR-85-0052

PROJECT NO. 2306

PROJECT NO. 2304

TASK NO. B1

TASK NO. A1

MONITOR: AFOSR
TR-88-0917

MONITOR: AFOSR
TR-88-0790

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Superlattice (SL) structures are both
fundamental and technical interest. Two classes of
superlattices have been investigated. In the first class,
the superlattice layers have lattice parameters that
closely match those of the substrate, such as in the case
of the AlGaAs-GaAs and In_{0.53}Ga_{0.47}As systems. In the
second class, the strained-layer superlattice (SLS) (1),
the alternating layers have lattice parameters that are
different by a significant amount, but the layers are
thin enough that the lattice mismatch is entirely
accommodated by elastically straining the layers without
the generation of misfit dislocations. Keywords: Aluminum,
Gallium arsenides, Indium phosphides. (mjm).

DESCRIPTORS: (U) *CRYSTAL LATTICES, *GALLIUM ARSENIDES,
*INDIUM PHOSPHIDES, *LATTICE DYNAMICS, ALUMINUM COMPOUNDS,
BUFFERS, DISLOCATIONS, EPITAXIAL GROWTH, LAYERS,
REDUCTION, SUBSTRATES.

IDENTIFIERS: (U) MUAFOSR2306B1, PEB1102F.

ABSTRACT: (U) The objective of the research is the
development and evaluation of iterative methods for
solving large systems of linear and nonlinear algebraic
equations, with emphasis on systems arising from the
discretization by finite difference methods or by finite
element methods of problems arising in computational
fluid dynamics involving partial differential equations.
Special attention is given to the determination of
parameters to accelerate the convergence of iterative
procedures, for solving the algebraic systems. Two types
of approaches have been taken. One approach involves
direct consideration of the algebraic system and includes
optimization techniques, dual adaptive techniques, and
hybrid techniques. As a tool for testing these and other
techniques several software packages have been developed
as part of the ITPACK project. The other approach
involved selection of iteration parameters based on
considering methods for solving related time-dependent
problems using variable time steps. (KR)

DESCRIPTORS: (U) *ITERATIONS, *PROBLEM SOLVING, *LINEAR
ALGEBRA, *NONLINEAR ALGEBRAIC EQUATIONS, EQUATIONS,
FINITE DIFFERENCE METHOD, FINITE ELEMENT ANALYSIS.

AD-A198 406

AD-A198 408

UNCLASSIFIED

PAGE 170 EVJ00F

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJOOF

AD-A198 407 6/4 6/5

AD-A198 407 CONTINUED

COLORADO UNIV AT BOULDER DEPT OF PSYCHOLOGY

SCHOOLS, SPECIALIZATION, STUDENTS, SYMPOSIA, VISION, WEST GERMANY.

(U) Conference on the Neurophysiological Foundations of Visual Perception.

IDENTIFIERS: (U) WUAFOSR2313A5, PE61102F.

DESCRIPTIVE NOTE: Final rept. 15 Mar 87-14 Mar 88.

MAR 88 7P

PERSONAL AUTHORS: Werner, John S.

CONTRACT NO. AFOSR-87-0146

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-88-0792

UNCLASSIFIED REPORT

ABSTRACT: (U) A Conference on the Neurophysiological Foundations of Visual Perception was held in Badenweiler, West Germany from 29 June to 3 July, 1987. In attendance were 75 scientists from all areas of vision research including the fields of anatomy, computer science, optometry, ophthalmology, physiology, and psychology. The participants were divided into individual working groups, each of which concentrated on a particular area of vision research. Each group presented a summary of the current state of the field for all conference participants. In this summary the participants emphasized the correlations between neuroanatomy, neurophysiology, psychophysics, and perception. The presentations were followed by extensive discussions that included all conference participants. Subsequent to the conference, each working group wrote a chapter to present their views on the state of the field in terms that can be understood by students and vision researchers working in other areas of specialization. These chapters will be published in a book by Academic Press in 1989. Keywords: Symposia, Conferences, Vision. (kt)

DESCRIPTORS: (U) *NEUROPHYSIOLOGY, *VISUAL PERCEPTION, ANATOMY, BOOKS, COMPUTERS, FOUNDATIONS(STRUCTURES), NEUROLOGY, OPHTHALMOLOGY, OPTOMETRY, PERCEPTION, PHYSIOLOGY, PRESSING(FORMING), PSYCHOLOGY, PSYCHOPHYSICS.

AD-A198 407

AD-A198 407

UNCLASSIFIED

DIYC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 406 12/1

AD-A198 406 CONTINUED

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Detection of Change Points Using Rank Methods.

MAR 88 13P

PERSONAL AUTHORS: Miao, B. Q.; Zhao, L. C.

REPORT NO. TR-88-02

CONTRACT NO. AFOSR-88-0030

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-88-0798

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper, the detection and estimation of change points of local parameters are studied by means of localization procedures and rank statistics. These techniques are also applied to detection and estimation of the change points of scale parameters and that of location parameters of directional data. Change point problem arises in many fields and attracts the attention of many authors. The techniques employed to detect and estimate the change point can generally be classified into two categories: parametric, and nonparametric. Bayesian methods also plays a major role. In this paper, the authors concentrate their attention on the problem of detection of change points of location parameter by localization and rank statistics when data are large. Their method is different from, and has some advantages over, the existing methods, such as CUSUM (cumulative sum) and Csorgo and Horvath's non-sequential nonparametric AROC (at most one change) procedures. First, localized procedures reduce computation. Second, these detecting and estimating procedures require no moment condition, instead it is only assumed that observed data come from a continuous distribution with a unique median. (kr)

DESCRIPTORS: (U) *BAYES THEOREM, *RANK ORDER STATISTICS, DETECTION, DIRECTIONAL, DISTRIBUTION, MOMENTS, PARAMETERS, STATISTICS.

AD-A198 406

AD-A198 406

UNCLASSIFIED

PAGE 172

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 405 12/3

AD-A198 404 20/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Discrimination Analysis when the Variates are Grouped and Observed in Sequential Order.

FEB 88 19P

DEC 87 4P

PERSONAL AUTHORS: Wu, Yuehua

PERSONAL AUTHORS: Dewar, Michael J.

REPORT NO. TR-88-03

CONTRACT NO. AFOSR-85-0022

CONTRACT NO. AFOSR-88-0030

PROJECT NO. 2304

PROJECT NO. 2303

TASK NO. A8

TASK NO. B2

MONITOR: AFOSR

MONITOR: AFOSR

TR-88-0797

TR-88-0858

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Suppose that measurements x sub i = (x sub i sub 1, ..., x sub i sub j sub 1, ..., x sub i sub j sub k , ..., x sub i sub j sub k , ..., x sub i sub j sub k , ...) can be taken on a unit sequentially in that order at the prescribed costs C_i , $i = 1, \dots, k$. The unit comes from one of the populations H sub 1 and H sub 2 , and it is desired to select a population (from these two) from which the unit is supposed to belong to, on the basis of the measurements x sub 1 , x sub 2 , ..., x sub k . Given the loss incurred by selecting population H sub 1 when in fact it belongs to H sub 2 , the prior probability p sub 1 of H sub 1 ($p = 1, 2$), and assuming that H sub 1 has the normal distribution $N(\mu$ sub 1 , $V)$, $i = 1, 2$, the author derives the sequential Bayesian solution of the discrimination problem when μ sub 1 , μ sub 2 and V are known. When μ sub 1 , V are unknown and must be estimated, He proposes a solution which is asymptotic Bayesian with exponential convergence rate. Keywords: Consistency, Exponential rate, Sequential procedure. (KR)

DESCRIPTORS: (U) *DISCRIMINATE ANALYSIS, *ORDER STATISTICS, BAYES THEOREM, CONVERGENCE, COSTS, DISCRIMINATION, EXPONENTIAL FUNCTIONS, NORMAL DISTRIBUTION, POPULATION, RATES, SEQUENCES, SOLUTIONS(General).

IDENTIFIERS: (U) WJAFOSR2304A6, PE81102F.

AD-A198 405

SUPPLEMENTARY NOTE: Pub. In Angewandte Chemie, v28 n12 p1273-1275 Dec 87.

ABSTRACT: (U) The recent discovery of high temperature superconductivity in certain mixed copper oxides has aroused much attention, not only because of possible practical applications but also because it cannot easily be explained in terms of the conventional Bardeen-Copper-Schrieffer (BCS) mechanism. Here, a radically different alternative is suggested, based on electron hopping between atoms of a metal in two different valence states under the control of two cooperating lattice vibrations. Other interpretations have involved variants of BCS theory, being likewise based on the conventional band theory of solids and electronphonon coupling. The mechanism suggested here postulates a strong coupling between pairs of lattice vibrations and electron hopping, leading to a breakdown of the Born-Oppenheimer approximation in a manner reminiscent of that involved in the Jahn-Teller effect. Such a situation cannot be discussed in terms of conventional band theory because this rests on the Born-Oppenheimer approximation. While the possibility that electron hopping might be involved in these new materials has been recognized the essential feature of the mechanism suggested here is novel. Reprints.

DESCRIPTORS: (U) *SUPERCONDUCTIVITY, *ELECTRICAL CONDUCTIVITY, *ELECTRON TRANSFER, BAND THEORY OF SOLIDS.

AD-A198 404

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 404 CONTINUED

AD-A198 402 7/8 7/4

COPPER COMPOUNDS, ELECTRODES, HIGH TEMPERATURE, MIXING, OXIDES, REPRINTS, SOLIDS, VARIATIONS, LATTICE DYNAMICS, SUPERCONDUCTORS, CERAMIC MATERIALS.

CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND BIOCHEMISTRY

IDENTIFIERS: (U) WJAF05K230382, PE61102F, Electron phonon coupling, *Copper Oxides.
(U) Holes, Electrons, Polarons, and Bipolarons and the Thermodynamics of Electrically Active Dopants in Conducting Polymers.

88 22P

PERSONAL AUTHORS: Reiss, H.; Kim, Dai-uk

CONTRACT NO. F49620-88-C-0060

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0823

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Nonlinear Optical and Electroactive Polymers, p281-301 1988.

ABSTRACT: (U) This paper describes how measurements of the reversible (equilibrium) distribution of an electrically active dopant, between an external phase and a conducting polymer, can be used to investigate both electronic species and electron energy level structures in such polymers. Examples are presented, involving conventional inorganic semiconductors, and it is shown how complications anticipated with conducting polymers have occurred and been overcome in these systems. Followed this, experiments on both absorption isotherms and conductivity for vapor phase iodine in both polythiophene and azite are described and analyzed for the determination of relevant species. The formations of triiodide and pentaiodide ions are indicated, and bipolarons appear to form in polythiophene. Reprints. (mjm)

DESCRIPTORS: (U) *IODINE, *POLYMERS, *THIOPHENES, *VAPOR PHASES, ABSORPTION, ELECTRICAL PROPERTIES, ELECTRON ENERGY, ELECTRONICS, ELECTRONS, ENERGY LEVELS, EXTERNAL, INORGANIC MATERIALS, ISOTHERMS, REPRINTS, SEMICONDUCTORS, STRUCTURES, THERMODYNAMICS.

AD-A198 404

AD-A198 402

UNCLASSIFIED

PAGE 174

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 402 CONTINUED

AD-A198 399 14/2 7/2

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, *Azite,
*Polythiophenes.

FLORIDA UNIV GAINESVILLE SPACE ASTRONOMY LAB

(U) Shuttle Flight Test of an Advanced Gamma-Ray Detection
System.

DESCRIPTIVE NOTE: Final rept. 1 Jul 83-31 Jul 87,

JUN 88 17P

PERSONAL AUTHORS: Rester, Alfred C., Jr

CONTRACT NO. F49620-83-C-0131, ARPA Order-4565

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR
TR-88-0932

UNCLASSIFIED REPORT

ABSTRACT: (U) The Gamma-Ray Advanced Detector (GRAD) is a gamma-ray detector systems consisting of a large-volume, n-type germanium detector with active shielding of bismuth germanate and plastic scintillators. It was diverted from the AFP-675 program to a balloon flight over Antarctica following the Challenger Disaster and the discovery the following year of the supernova 1987A. The present report outlines activities leading to and following the decision to go to Antarctica and summarizes the basic technological results from the project. Keywords: Gamma ray detector, n type Germanium detector. (mjm)

DESCRIPTORS: (U) *BISMUTH COMPOUNDS, *DETECTORS, *GAMMA RAYS, *GERMANATES, *GERMANIUM, *N TYPE SEMICONDUCTORS, *SPACE SHUTTLES, ANTARCTIC REGIONS, FLIGHT TESTING, SHIELDING, SPACE FLIGHT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1, *Germanium detector, *Gamma ray detector.

AD-A198 402

AD-A198 399

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 398 12/5

JOHNS HOPKINS UNIV LAUREL MD APPLIED PHYSICS LAB
(U) Evaluation Methodology for Software Engineering.

DESCRIPTIVE NOTE: Final Rept. 1 Jun 87-31 May 88.

MAY 88 14P

PERSONAL AUTHORS: Blum, Bruce Y.

REPORT NO. APL/JHU/RMI-88-007

CONTRACT NO. AFOSR-87-0219

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-88-0791

UNCLASSIFIED REPORT

ABSTRACT: (U) The topic of this research involves two categories of investigation. One centers on the methods used for evaluation in the various scientific disciplines. The PI is studying these methods, but the research is not yet to the point that a unifying paper directed to the software engineering problem can be produced. The second area of investigation is that of the software process and what can be evaluated with respect to it. In this domain, work progress through small experiments and conceptual studies. Considerable accomplishments have been reported for the first year of research. There is every reason to believe that this progress will continue in the remaining two years of study and that some unified theory for process evaluation will evolve. (fr)

DESCRIPTORS: (U) *SYSTEMS ENGINEERING, COMPUTER PROGRAMS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A9, SOFTWARE ENGINEERING.

AD-A198 398

UNCLASSIFIED

PAGE 176

EVJ00F

AD-A198 397 20/3

HARRIS CORP MELBOURNE FL GOVERNMENT AEROSPACE SYSTEMS
DIV

(U) Robust, Reduced-Order, Nonstrictly Proper State Estimation via the Optimal Projection Equations with Guaranteed Cost Bounds.

DESCRIPTIVE NOTE: Journal article.

JUN 88 8P

PERSONAL AUTHORS: Haddad, Wassim M.; Bernstein, Dennis S.

CONTRACT NO. F49820-86-C-0002

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0821

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, v33 no p591-595 Jun 88.

ABSTRACT: (U) A state-estimation design problem involving parametric plant uncertainties is considered. An estimation error bound suggested by multiplicative white noise modeling is utilized for guaranteeing robust estimation over a specified range of parameter uncertainties. Necessary conditions which generalize the optimal projection equations for reduced order state estimation are used to characterize the estimator which minimizes the error bound. The design equations thus effectively serve as sufficient conditions for synthesizing robust estimators. Additional features include the presence of a static estimation gain in conjunction with the dynamic (Kalman) estimator to obtain a nonstrictly proper estimator. Keywords: Reprints. (KR)

DESCRIPTORS: (U) *ESTIMATES, *MATHEMATICAL MODELS, *WHITE NOISE, COSTS, EQUATIONS, ERRORS, GAIN, GUARANTEES, MULTIPLICATION FACTOR, OPTIMIZATION, PARAMETERS, REDUCTION, REPRINTS, STATICS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1.

AD-A198 397

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 386 9/1 12/4

AD-A198 389 4/1

HARRIS CORP MELBOURNE FL GOVERNMENT AEROSPACE SYSTEMS
DIV

COLORADO UNIV AT BOULDER

(U) The Optimal Projection Equations with Petersen-Hollot Bounds: Robust Stability and Performance via Fixed-Order Dynamic Compensation for Systems with Structured Real-Valued Parameter Uncertainty.

(U) Remeasurement of the Rate Constant and Branching Ratio for the $N(2)^+ + O$ Reaction,

88

PERSONAL AUTHORS: Knutsen, Karen; Bierbaum, Veronica M.; Leone, Stephen R.

PERSONAL AUTHORS: Bernstein, Dennis S.; Haddad, Wassim M.

CONTRACT NO. AFOSR-88-0018

CONTRACT NO. F49620-86-C-0002

PROJECT NO. 2303

PROJECT NO. 2304

TASK NO. 81

TASK NO. A1

MONITOR: AFOSR

MONITOR: AFOSR
TR-88-0822

TR-88-0813

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, v33 n6 p573-582 1988.

SUPPLEMENTARY NOTE: Pub. in Planetary and Space Science, v36 n3 p307-310 1988.

ABSTRACT: (U) A feedback control design problem involving structured real-valued plant parameter uncertainties is considered. A quadratic Lyapunov bound suggested by recent work is utilized in conjunction with the guaranteed cost approach to guarantee robust stability with robust performance bound. Necessary conditions which generalize the optimal projection equations for fixed-order dynamic compensation are used to characterize the controller which minimizes the performance bound. The design equations thus effectively serve as sufficient conditions for synthesizing dynamic output-feedback controllers which provide robust stability and performance. (jnd)

DESCRIPTORS: (U) *CONTROL THEORY, *FEEDBACK, *LYAPUNOV FUNCTIONS, QUADRATIC EQUATIONS, OPTIMIZATION, REPRINTS, COSTS, GUARANTEES.

IDENTIFIERS: (U) Electronic components, PE61102F, WJAFOSR2304A1.

ABSTRACT: (U) Model calculations of atmospheric ion constituents based on current experimental data predict thermospheric N_2^+ densities in excess of measurements taken by the Atmospheric Explorer satellite by up to a factor of two at altitudes between 200 - 400 km (Breig et al., 1983). The major sources of N_2^+ in the thermosphere are photoionization, electron impact ionization, and charge exchange with $O^+(2D)$. A major sink of N_2^+ in this region is the reaction: The discrepancy between the currently accepted thermospheric N_2^+ model and measured values would be resolved if either this reaction is much faster than has hitherto been reported, or if vibrational excitation in N_2^+ enhances the rate significantly. Selective vibrational enhancement of the (1b) channel leading to O^+ has been suggested, since a simple increase in the overall reaction rate would increase the N_2^+ production and transfer the discrepancy to thermospheric NO^+ densities (Abdou et al., 1984). In consideration of this problem, we have remeasured the rate constant and branching ratio for the ground state $N_2^+ + O$ reaction at thermal energy. Reprints. (jes)

DESCRIPTORS: (U) *IONIZATION, *THERMOSPHERE, CHARGE TRANSFER, ELECTRON IMPACT SPECTRA, EXCITATION,

AD-A198 386

AD-A198 389

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 389 CONTINUED

AD-A198 388 12/3

EXPERIMENTAL DATA, MODELS, PHOTOIONIZATION, PRODUCTION,
RATES, RATIOS, REACTION TIME, REPRINTS, THERMAL RADIATION,
VIBRATION, ATMOSPHERICS.

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER
ENGINEERING

(U) Remarks on Discretization and Linear Equivalence of
Continuous Time Nonlinear Systems.

IDENTIFIERS: (U) PE81102F, WJAFOSR230381.

DEC 87 4P

PERSONAL AUTHORS: Lee, Hong-Gi; Arapostathis, Aristotle;
Marcus, Steven I.

CONTRACT NO. F49620-88-C-0045, SAFOSR-88-0029

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0814

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in the Proceedings of the IEEE
Conference on Decision and Control (26th), p1783-1785 Dec
87.

ABSTRACT: (U) The effect of sampling on linear
equivalence for continuous time systems is investigated.
It is shown that the discretized system is linearizable
by state coordinate change for an open set of sampling
time if and only if the continuous time system is
linearizable by state coordinate change. Also, for $n=2$,
we show that even though the discretized system is
linearizable by state coordinate change and feedback, the
continuous time affine complete analytic system is
linearizable by state coordinate change only. Also a
method of proof is suggested when $n > 3$. Keywords:
Discretization, Linearization, Nonlinear systems,
Reprints. (Jnd)

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *DISCRETE
DISTRIBUTION, COORDINATES, LINEARITY, REPRINTS, SAMPLING,
TIME, STATISTICAL SAMPLES.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A1, Discretization,
Linearization.

AD-A198 389

AD-A198 388

UNCLASSIFIED

PAGE 178

EVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 387 12/4

AD-A198 386 12/4

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Adaptive Control of Stochastic Bilinear Systems,

(U) A Model Reference Adaptive Control Scheme for Pure-Feedback Nonlinear Systems,

DEC 87 3P

JUN 87 7P

PERSONAL AUTHORS: Cho, Hengju; Marcus, Steven I.

PERSONAL AUTHORS: Nam, Kwanghee; Arapostathis, Aristotle

CONTRACT NO. F49620-86-C-0045, \$AFOSR-86-0029

CONTRACT NO. AFOSR-86-0029, \$NSF-ECS83-07547

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A1

TASK NO. A1

MONITOR: AFOSR TR-88-0811

MONITOR: AFOSR TR-88-0810

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the IEEE Conference on Decision and Control (28th) p314-315 Dec 87.

SUPPLEMENTARY NOTE: Pub. in the Proceedings of the American Control Conference, p577-582 Jun 87.

ABSTRACT: (U) The minimum variance control law for bilinear systems with known parameters is shown to yield in most cases controls with infinite variance; this calls into question the use of the so-called bilinear self-tuning regulators. An adaptive weighted minimum variance controller based upon the cost with weighted control efforts is suggested for first order bilinear systems and is shown to yield boundedness of the closed loop system variables under a certain condition on the parameter estimate. Keywords: Adaptive control, Bilinear systems, Minimum variance control, Reprints. (jhd)

ABSTRACT: (U) A model reference adaptive control scheme is presented for nonlinear systems in a pure-feedback canonical form with unknown parameters. The presence of parameter uncertainty in the system causes imperfect linearization, i.e., it introduces nonlinear additive terms in the transformed coordinates. Provided that these nonlinear terms are dominated by the norm of the transformed state, global convergence of the output error is established for all initial estimates of the parameter vector lying in an open neighborhood of the true parameters in the parameter space. Keywords: Model reference adaptive control, Nonlinear systems, Reprints. (jhd)

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *STOCHASTIC PROCESSES, CLOSED LOOP SYSTEMS, CONTROL, CONTROL THEORY, COSTS, ESTIMATES, PARAMETERS, REPRINTS, VARIABLES, VARIATIONS, WEIGHTING FUNCTIONS.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *NONLINEAR SYSTEMS, *FEEDBACK, ADDITIVES, CONVERGENCE, ERRORS, ESTIMATES, GLOBAL, LINEARITY, MODELS, OUTPUT, PARAMETERS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A1.

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A1.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 385 12/4

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER
ENGINEERING(U) Remarks on Smooth Feedback Stabilization of Nonlinear
Systems,

88

5P

PERSONAL AUTHORS: Lee, Kyun K.; Arapostathis, Aristotle

CONTRACT NO. AFOSR-88-0022d, SNSF-ECS83-07547

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0893

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Systems and Control Letters,
v10 p41-44 1988.

ABSTRACT: (U) The problem of smooth feedback stabilization of nonlinear systems with stable uncontrolled dynamics is investigated. Sufficient conditions are presented for the existence of a smooth feedback stabilizing control that are also necessary in the case of linear systems. Analogous results are established for discrete time systems. Keywords: Control systems; Stabilization; Controllability; Nonlinear systems; Reprints. (jhd)

DESCRIPTORS: (U) *CONTROL SYSTEMS, *FEEDBACK, *NONLINEAR SYSTEMS, CONTROL, DYNAMICS, LINEAR SYSTEMS, REPRINTS, STABILITY, STABILIZATION, TIME.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1.

AD-A198 385

UNCLASSIFIED

AD-A198 384 7/8 20/8

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Third-Order Nonlinear Optical Effects in Organic
Polymeric Films,

88

13P

PERSONAL AUTHORS: Prasad, Paras N.

REPORT NO. SUNY/AB/TR-19

CONTRACT NO. F49620-87-C-0042, F49620-87-C-0097

PROJECT NO. 2303, D812

TASK NO. A3, J1

MONITOR: AFOSR
TR-88-0812

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of Materials
Research Society Symposium, v108 p271-282 1988.

ABSTRACT: (U) This paper presents some recent theoretical and experimental work carried out in the author's laboratory on the nonlinear optical properties of organic polymers. The ab initio SCF theory has been used with the finite field method to calculate the third order nonlinearity of conjugated structures in order to understand the effect of conjugation and the role of substituents. Experimental studies of third order resonant nonlinearity in polythiophenes and cumylphenoxy phthalocyanine, the latter in the form of Langmuir-Blodgett films, are presented using femtosecond degenerate four wave mixing. Keywords: Third-order nonlinear optical effects, Organic polymeric films. (jes)

DESCRIPTORS: (U) *OPTICAL PROPERTIES, *POLYMERS, EXPERIMENTAL DATA, FILMS, LABORATORIES, MIXING, NONLINEAR SYSTEMS, ORGANIC COMPOUNDS, ORGANIC MATERIALS, PHTHALOCYANINES, RESONANCE, STRUCTURES, THEORY, WAVES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, WUAFOSR812J1, ORGANIC POLYMER FILMS, LANGMUIR BLODGETT FILMS.

AD-A198 384

PAGE 180 EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 383

7/8

AD-A198 383 CONTINUED

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Formation and Electrochemistry of Polyfluorene in Ambient Temperature Ionic Liquids.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B2, POLYFLUORENE.

DESCRIPTIVE NOTE: Rept. for 1 Dec 86-31 May 87,

JAN 88 8P

PERSONAL AUTHORS: Janiszewska, L.; Osteryoung, R. A.

CONTRACT NO. AFOSR-87-0088

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-88-0829

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electrochemical Society, v135 n1 p116-122 Jan 88.

ABSTRACT: (U) Polyfluorene films were deposited on platinum, tungsten, and glassy carbon electrodes by the anodic oxidation of the monomer in ambient temperature molten salts consisting of a mixture of aluminum chloride and 1-methyl-3-ethylimidazolium chloride. The polymer films are conductive in the oxidized state and nonconductive when reduced. The collection efficiency measured by rotating ring-disk voltammetry in neutral melts suggest that two protons per monomer are released during the polymerization process for both polyfluorene and polypyrrole formation. The polyfluorene films obtained in these molten salts are more stable and their electrochemical behavior less complicated than those prepared in acetonitrile. Keywords: Electroactive polymers, Chloroaluminates, Polymerization mechanism, Reprints. (Jes)

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *POLYMERIZATION, *POLYMERS, ACETONITRILE, ALUMINUM COMPOUNDS, ANODIC COATINGS, CHLORIDES, COLLECTION, DEPOSITION, EFFICIENCY, ELECTROCATALYSTS, ELECTRODES, FUSED SALTS, GLASSY CARBON, MELTS, MIXTURES, NEUTRAL, OXIDATION, PLATINUM, POLYMERIC FILMS, PROTONS, PYRROLES, REPRINTS, TEMPERATURE, TUNGSTEN.

AD-A198 383

AD-A198 383

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 382 7/2 20/13

AD-A198 381 12/4

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

HARRIS CORP MELBOURNE FL

(U) Anomalies in the Heat-Capacity Signatures of Submonolayer Adsorbates with Attractive Lateral Interactions.

(U) Unified Optimal Projection Equations for Simultaneous Reduced-Order, Robust Modelling, Estimation and Control.

JAN 88 7P

DESCRIPTIVE NOTE: Journal article.

PERSONAL AUTHORS: Kim, Young S.; Battaglia, Franco; George, Thomas F.

88 17P

REPORT NO. 68

PERSONAL AUTHORS: Haddad, Wassim M.; Bernstein, Dennis S.

CONTRACT NO. F49620-88-C-0008, NSF-CHE88-20274

CONTRACT NO. F49620-88-C-0002

PROJECT NO. 2303

PROJECT NO. 2304

TASK NO. 83

TASK NO. A1

MONITOR: AFOSR
TR-88-0880

MONITOR: AFOSR
TR-88-0853

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Intl. of Chemical Physics, v88 n11 p7066-7070, 1 Jun 88.

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Control, v47 n4 p1117-1132 1988.

ABSTRACT: (U) The analytic closed form of the heat-capacity signatures previously derived for the McQuistan-Hock (MQH) model of a lattice gas is applied to various adsorbed systems for which the whenever the adsorption system can be described by a two-dimensional gas on which the substrate effects are less important than the adatom-adatom interactions, the computed temperatures at which the heat-capacity signatures display their maximum are in excellent agreement with the experimental measurements. Keywords: Heat capacities, Submonolayer adsorbates, Attractive lateral interactions, Anomalies, McQuistan-Hock model, Two-dimensional lattice gas, Reprints. (jes)

DESCRIPTORS: (U) *OXYGEN, ADSORPTION, CAPACITY(QUANTITY), EXPERIMENTAL DATA, GASES, HEAT, MEASUREMENT, REPRINTS, SIGNATURES, SUBSTRATES, TEMPERATURE, TWO DIMENSIONAL, THERMODYNAMICS.

IDENTIFIERS: (U) PEG1102F, WUAFOSR230383.

DESCRIPTORS: (U) *CONTROL THEORY, *STOCHASTIC CONTROL, COMPENSATION, COUPLING(INTERACTION), DYNAMICS, LYAPUNOV FUNCTIONS, OPTIMIZATION, REDUCTION, REPRINTS, RICCATI EQUATION, SPECIALIZATION, SYNCHRONISM.

AD-A198 382

AD-A198 381

UNCLASSIFIED

PAGE 182

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 381 CONTINUED

AD-A198 380 7/8

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1.

CARNEGIE-MELLON UNIV PITTSBURGH PA

(U) Rheological, Rheo-Optical and Light Scattering Studies on Nematic Solutions of Poly(1,4-Phenylene-2,6-Benzobisthiazole).

88 17P

PERSONAL AUTHORS: Berry, Guy C.; Se, Kazunori; Srinivasarao, Mohan

CONTRACT NO. F49620-85-C-1040

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0830

UNCLASSIFIED REPORT

ABSTRACT: (U) Rheological and rheo-optical properties of mesogenic solutions of rodlike polymers are discussed. Some of the salient features of the observed behavior with isotropic solutions described, including a single-integral constitutive equation that is found to be useful, and a review of certain aspects of theoretical treatments of the viscosity of nematic fluids. The light scattering experiments are discussed, including studies on a monodomain formed with a PBT solution. Aspects of the rheological behavior of nematic solutions of PBT are considered, first for recently small strain and then for deformation with large strain rates. Reprints, Thiazoles. (mjm)

DESCRIPTORS: (U) *RHEOLOGY, *THIAZOLES, *PHENYL RADICALS, BEHAVIOR, DEFORMATION, EQUATIONS, EXPERIMENTAL DATA, FLUIDS, ISOTROPISM, LIGHT SCATTERING, LIQUID CRYSTALS, OPTICAL PROPERTIES, REPRINTS, SOLUTIONS(GENERAL), STRAIN RATE, VISCOSITY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, *Thiazole/benzobis 2,6-1,4-phenylene.

AD-A198 381

AD-A198 380

UNCLASSIFIED

PAGE 183

EVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 379 12/3

AD-A198 378 20/12 7/8

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Conditional Scores and Optimal Scores for Generalized Linear Measurement-Error Models.

87 15P

CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND BIOCHEMISTRY

(U) Thermodynamically Reversible Uptake of Electrically Active Dopants in Conducting Polymers: Iodine in Polythiophene.

PERSONAL AUTHORS: Stefanski, Leonard A.; Carroll, Raymond J.

88 8P

CONTRACT NO. F49620-85-C-0144

PERSONAL AUTHORS: Kim, Dal-uk; Reiss, H.; Rabeony, M. W.

PROJECT NO. 2304

CONTRACT NO. F49620-88-C-0060

TASK NO. A6

PROJECT NO. 2303

MONITOR: AFOSR

TASK NO. A3

TR-88-0777

MONITOR: AFOSR
TR-88-0884

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Biometrika, V74 n4 p703-715 1987.

SUPPLEMENTARY NOTE: Pub. in the Jnl. of Physical Chemistry, v92 n9 p2873-2879 1988.

ABSTRACT: (U) This reprint studies estimation in generalized linear models in canonical form when the explanatory vector is measured with independent normal error. For the functional case, i.e. when the explanatory vectors are fixed constants, unbiased score functions are obtained by the authors for logistic regression. In the case that the explanatory vectors are independent and identically distributed with unknown distribution, efficient score functions are identified. Related results for the structural case are given by Bickel & Ritov (1987) (KR)

DESCRIPTORS: (U) *LINEARITY, *MATHEMATICAL MODELS, *SCORING, CONSTANTS, ERRORS, ESTIMATES, LOGISTICS, OPTIMIZATION, REGRESSION ANALYSIS, REPRINTS, STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A6.

AD-A198 379

AD-A198 378

UNCLASSIFIED

PAGE 184

EVJ00F

DESCRIPTORS: (U) *POLYMERS, *THERMODYNAMICS, *DOPING, ABSORPTION, DESORPTION, ELECTRICAL PROPERTIES, EQUILIBRIUM(GENERAL), FILMS, HYSTERESIS, IODINE, IRREVERSIBLE PROCESSES, ISOTHERMS, MEASUREMENT, REPRINTS.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 378 CONTINUED

REVERSIBLE, THEORY, THIOPHENES, VAPOR PHASES.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303A3, *ACTIVE
DOPANTS, CONDUCTING POLYMERS.

AD-A198 377 7/2

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Computational Studies of SiH₂+SiH₂ Recombination
Reaction Dynamics on a Global Potential Surface Fitted
to Ab Initio and Experimental Data.

MAY 88 18P

PERSONAL AUTHORS: Agrawal, Paras M.; Thompson, Donald L.;
Raff, Lionel M.

CONTRACT NO. AFOSR-86-0043, \$AFOSR-85-0115

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0863

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in the Jnl. of Chemical Physics,
V88 n9 p5948-5962, 1 May 88.

ABSTRACT: (U) The recombination dynamics for the SiH₂
+SiH₂ = SiH₄ reaction are studied by quasiclassical
trajectory methods using a global potential-energy
surface fitted to the available experimental data and the
results of various ab initio calculations. The potential
surface is written as the sum of 18 many-body terms whose
functional forms are motivated by chemical and physical
considerations. The surface contains 41 parameters which
are fitted to calculated geometries, fundamental
vibrational frequencies, and energies for H₂Si = SiH₂,
H₂Si = SiH, H₂Si = Si, HSi = Si, Si₂H₂, and SiH₂ and to
various calculated and/or measured reaction barrier
heights and activation energies. In general, the
equilibrium bond lengths and angles given by the global
surface are in agreement with ab initio results to within
0.03 Å and 0.5°, respectively. Keywords: Silicon compounds,
Silicon hydrides, Reprints. (mjlm)

DESCRIPTORS: (U) *HYDRIDES, *RECOMBINATION REACTIONS,
*SILICON, *SILICON COMPOUNDS, ACTIVATION ENERGY, BONDING,
COMPUTATIONS, DYNAMICS, EQUILIBRIUM(GENERAL),
EXPERIMENTAL DATA, FREQUENCY, GLOBAL, LENGTH, REPRINTS,
SURFACES, TRAJECTORIES, VIBRATION.

AD-A198 378

AD-A198 377

UNCLASSIFIED

PAGE 185

EVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 377 CONTINUED

AD-A198 375 11/2

IDENTIFIERS: (U) PE81102- WUAFOSR230383, *Silicon
hydride.

SOUTHWEST RESEARCH INST SAN ANTONIO TEX DEPT OF
MATERIALS SCIENCES

(U) Study of High Temperature Failure Mechanisms in
Ceramics.

DESCRIPTIVE NOTE: Final rept. 1 Apr 85-31 Mar 88,

JUN 88 68P

PERSONAL AUTHORS: Page, Richard A.; Lankford, James

REPORT NO. SWRI-8578/5

CONTRACT NO. F49620-85-C-0073

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0804

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the results of a fundamental study involving experimental characterization and analytical modeling of grain boundary cavitation and creep crack growth in structural ceramics exposed to pure tensile loading. The major experimental techniques employed in the program are the use of small-angle neutron scattering to characterize cavity nucleation and growth and stereomaging analysis to characterize the stress and strain fields associated with growing creep cracks. The major accomplishments described in the report include the design, construction, and successful testing of a creep apparatus that permits creep testing of ceramics under pure tensile loading, the determination of surface preparation conditions that are adequate for the stereomaging analysis, and the conduct of a series of creep tests designed to characterize the kinetics of damage accumulation under pure tensile loading. (jes)

DESCRIPTORS: (U) *CERAMIC MATERIALS, ACCUMULATION, ANGLES, CAVITATION, CAVITIES, CRACK PROPAGATION, CRACKS, CREEP, CREEP TESTS, DAMAGE, EXPERIMENTAL DESIGN, FAILURE, GRAIN BOUNDARIES, HIGH TEMPERATURE, KINETICS, LOADS(FORCES), MATHEMATICAL MODELS, METHODOLOGY, NEUTRON

AD-A198 377

AD-A198 375

UNCLASSIFIED

PAGE 186

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJOOF

AD-A198 375 CONTINUED

SCATTERING, NUCLEATION, PREPARATION, PURITY, STRUCTURAL
PROPERTIES, SURFACE PROPERTIES, TENSILE PROPERTIES, TEST
AND EVALUATION.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2.

AD-A198 374 12/1

HARRIS CORP MELBOURNE FL

(U) Inequalities for the Trace of Matrix Exponentials.

DESCRIPTIVE NOTE: Journal article.

APR 88 4P

PERSONAL AUTHORS: Bernstein, Dennis S.

CONTRACT NO. F49620-88-C-0002

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0852

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Matrix Anal.
Appl., v9 n2 p158-158 Apr 88.

ABSTRACT: (U) In this report several inequalities
involving the trace of matrix exponentials are derived.
Keywords: Matrix exponential, Trace, Golden Thompson
inequality, Symmetry. (KR)

DESCRIPTORS: (U) *INEQUALITIES, EXPONENTIAL FUNCTIONS,
MATRICES(MATHEMATICS).

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 373 7/4 20/5

AD-A198 373 CONTINUED

CORNELL UNIV ITHACA NY DEPT OF CHEMISTRY

(U) State-Selective Studies of γ Yields R, V Energy Transfer: The H + CO System.

MAY 88 8P

PERSONAL AUTHORS: Chawla, G. W.; McBane, G. C.; Houston, P. L.; Schatz, G. C.

CONTRACT NO. AFOSR-88-0007

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0888

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v88
n9 p5481-5488, 1 May 88.

ABSTRACT: (U) Collisional energy transfer from H atoms to the carbonyl radical ($v = 0$, J approx. 2) has been studied by photolyzing hydrogen sulfide at 222 nm in a nozzle expansion with CO and probing the CO(v' , J') levels using tunable VUV laser-induced fluorescence. The ratio CO($v' = 1$)/CO($v' = 0$) is found to be 0.1 + or - 0.008. The rotational distribution of CO($v' = 0$) peaks at $J' < 11$ and decays gradually; population is still observed at $J' > 45$. The rotational distribution of CO($v' = 1$) is broad and peaks near $J' = 20$. The experimental results are compared to quasiclassical trajectory calculations performed both on the H + CO surface of Bowman, Bittman, and Harding (BBH) and on the surface of Murrell and Rodriguez (MR). The experimental rotational distributions, particularly those for CO($v' = 1$), show that the BBH surface is a better model than the MR surface. The most significant difference between the two surfaces appears to be that for energetically accessible regions of configuration space the derivative of the potential with respect to the CO distance is appreciable only in the HCO valley for the BBH surface, but is large for all H atom approaches in the MR potential. Because the H-CO geometry is bent in this valley, vibrational excitation on the BBH surface is

accompanied by appreciable rotational excitation, as observed experimentally. Reprints. (aw)

DESCRIPTORS: (U) *ENERGY TRANSFER, *PHOTOLYSIS, *HYDROGEN, *CARBONYL COMPOUNDS, COLLISIONS, DISTRIBUTION, EXCITATION, EXPANSION, LASER INDUCED FLUORESCENCE, NOZZLES, REPRINTS, ROTATION, SURFACES, TRAJECTORIES, TUNING, VACUUM ULTRAVIOLET RADIATION, VIBRATION, YIELD, MOLECULE MOLECULE INTERACTIONS, HYDROGEN SULFIDE.

IDENTIFIERS: (U) *Atom molecule interactions, PE8102F, WUAFOSR230381.

AD-A198 373

AD-A198 373

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 372 11/4 11/9 11/10

AD-A198 371 7/3 7/6

MINNESOTA UNIV MINNEAPOLIS DEPT OF AEROSPACE
ENGINEERING AND MECHANICS

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Crazing in Polymeric and Composite Systems.

(U) New Experimental Challenges in Elemental Fluorine
Chemistry; an Emerging Technology.

DESCRIPTIVE NOTE: Annual technical rept. 15 Mar 87-14 Mar
88,

DESCRIPTIVE NOTE: Final rept. 1 Nov 86-31 Oct 87,

APR 88 89P

OCT 87 30P

PERSONAL AUTHORS: Hsiao, C. C.

PERSONAL AUTHORS: Lagow, Richard J.

CONTRACT NO. AFOSR-87-0143

CONTRACT NO. AFOSR-87-0016

PROJECT NO. 2302

PROJECT NO. 2303

TASK NO. B2

TASK NO. B2

MONITOR: AFOSR

MONITOR: AFOSR

TR-88-0779

TR-88-0780

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The study of the failure of composite systems under stress is important both theoretically and practically. This program aims to develop time dependent theories for studying crazing behavior of stressed polymeric and composite systems. Certain microstructural characteristics developed during deformation are considered in the mathematical formulations. This includes the development of basic analytical tools in creating possible constitutive modeling of thermo-mechanical behavior of polymeric and composite systems at combined micro- and macrostructural levels. This noncontinuum craze-crack transition is based on mesomechanical considerations which yield information upon damage micromechanics of crazing and failure behavior of polymeric and composite systems. (av)

ABSTRACT: (U) This final report covers the most recent progress in this research program which has had ongoing support from AFOSR for the past twelve years including the synthesis of perfluoropolyethers via hydrocarbon polyesters, the synthesis of branched perfluoroethers, the synthesis of the first perfluoro crown ethers and the process for partial fluorination of gas separation membranes. Keywords: Elemental fluorine, Copolymerization, Direct fluorination, Polymers, Perfluoropolyethers, Fluorocarbons. (jes)

DESCRIPTORS: (U) *CRAZING, *COMPOSITE MATERIALS, *POLYMERS, DAMAGE, DEFORMATION, FAILURE, FORMULAS(MATHEMATICS), MATHEMATICAL ANALYSIS, MECHANICS, MICROSTRUCTURE, MODELS, STRESSES, THEORY, THERMOMECHANICS, TIME DEPENDENCE.

DESCRIPTORS: (U) *COPOLYMERIZATION, *ETHERS, *FLUORINATION, *HYDROCARBONS, FLUORINATED HYDROCARBONS, FLUORINE COMPOUNDS, FLUOROPOLYMERS, GASES, MEMBRANES, POLYESTER FIBERS, POLYETHERS, POLYMERS, SEPARATION, SYNTHESIS(CHEMISTRY).

IDENTIFIERS: (U) PE61102F WUAFOSR230282

IDENTIFIERS: (U) PE61102F, WUAFOSR230382

AD-A198 372

AD-A198 371

UNCLASSIFIED

PAGE 185

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 370 12/3

AD-A198 369 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) On a Joint Strong Approximation Theorem for Record and Inter-Record Times,

(U) On the Distance between Mixed Poisson and Poisson Distribution,

87 12P

87 14P

PERSONAL AUTHORS: Pfeiffer, D.

PERSONAL AUTHORS: Pfeiffer, D.

REPORT NO. TR-120

REPORT NO. TR-115

CONTRACT NO. F49620-85-C-0144

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR
TR-88-0837

MONITOR: AFOSR
TR-88-0836

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Probability Theory and Related Fields, v75 n213-221 1987.

SUPPLEMENTARY NOTE: Pub. in Statistics and Decisions, v5 p387-379 1987.

ABSTRACT: (U) This document presents a simple joint strong approximation for the logarithms of record and inter-record times from an exchangeable sequence, including an exact estimation for the rate of convergence in terms of upper and lower class functions of a Wiener process. The approach chosen here allows for simple proofs of exact and asymptotic (joint) results for record and inter-record times, such as the Law of Large Numbers, Central Limit Theorem and Law of the Iterated Logarithm, and others. Keywords: Random variables, Probability, Reprints. (kr)

ABSTRACT: (U) Estimations and asymptotic expansions for several distances between mixed Poisson and Poisson distributions are given, such as the total variation distance, the Kolmogorov distance and a specific Wasserstein distance (Fortet-Mourier distance). As an example, this reprint generalizes and improves results of Vervaat on the total variation distance between negative binomial and Poisson distributions. The main tool is an appropriate application of operator semigroups and their probabilistic representation theory. Keywords: Poisson approximation, Negative Poisson binomial distributions, Operator semigroups, Total variation distance, Wasserstein distance. (KR)

DESCRIPTORS: (U) *APPROXIMATION(MATHEMATICS), *THEOREMS, ESTIMATES, CONVERGENCE, RANDOM VARIABLES, PROBABILITY, REPRINTS.

DESCRIPTORS: (U) *POISSON DENSITY FUNCTIONS, *RANGE(DISTANCE), ESTIMATES, REPRINTS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 367 CONTINUED

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS MOVES LAB
OF CHEMICAL PHYSICS

IDENTIFIERS: (U) PEB1102F, WUAFOSR2303B3.

(U) Circular Dichroism in Photoelectron Angular
Distributions from Two-Color (1+1) REMPI (Resonantly
Enhanced Multiphoton Ionization) of NO.

DEC 87 8P

PERSONAL AUTHORS: Applig, J. R.; White, M. G.; Dubs, R.
L.; Dixit, S. N.; McKay, V.

CONTRACT NO. AFOSR-87-0039

PROJECT NO. 2303

TASK NO. 83

MONITOR: AFOSR
TR-88-0824

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87
n12 p8927-8933, 15 Dec 87.

ABSTRACT: (U) A detailed experimental and theoretical study of dichroic effects in photoelectron angular distributions is reported for (1 + 1), two-color REMPI of NO via the A2 sigma+, v = 0 state. Optically aligned A state rotational levels are probed through ionization by circularly polarized light. Resultant photoelectron angular distributions exhibit significant left right asymmetry, the phase and magnitude of which are shown to be related to the curvature of the excited state Mj distribution. Theoretical calculations involving a full ab initio treatment of the ionization dynamics result in circularly dichroic angular distribution (CDAD) parameters in good agreement with those derived experimentally. Additional effects including hyperfine depolarization and coherence are also discussed in relation to the observed CDAD data. Keywords: Nitrogen, Oxides, Reprints. (MJM)

DESCRIPTORS: (U) *DICHROISM, *NITROGEN OXIDES, ANGLES, ASYMMETRY, CIRCULAR, COMPUTATIONS, DISTRIBUTION, DYNAMICS, IONIZATION, LIGHT, PHOTOELECTRONS, PHOTOIONIZATION, POLARIZATION, REPRINTS, ROTATION, THEORY.

AD-A198 367

AD-A198 367

UNCLASSIFIED

PAGE 191

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 368 21/2 20/4

AD-A198 368 CONTINUED

SIBLEY SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING
ITHACA NY

PROPAGATION, *TURBULENT FLOW, DETERMINANTS(MATHEMATICS),
EVOLUTION(GENERAL), FLUIDS, GEOMETRY, MATERIALS, MIXING,
PROBABILITY, REPRINTS, SURFACE PROPERTIES, SURFACES,
TURBULENCE, VELOCITY, DETERMINANTS(MATHEMATICS),
DIFFUSION, EQUATIONS, EVOLUTION(GENERAL), FLAMES, FLUIDS,
GEOMETRY, MATERIALS, MIXING, PROBABILITY, PROPAGATION,
REPRINTS, SURFACE PROPERTIES, SURFACES, TURBULENCE,
TURBULENT FLOW, VELOCITY

(U) The Evolution of Surfaces in Turbulence,

88 28P

PERSONAL AUTHORS: Pope, S. B.

CONTRACT NO. AFOSR-85-0083

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0835

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2, *Turbulent
mixing, Schmidt number.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of
Engineering Science, v26 n5 p445-469 1988.

ABSTRACT: (U) There are several phenomena that can be
described to advantage in terms of surfaces within a
turbulent fluid. Examples are: turbulent mixing
(particularly at high Schmidt number); turbulent premixed
flames; and, turbulent diffusion flames. These phenomena
can (under appropriate conditions) be analyzed in terms
of material surfaces, propagating surfaces, and constant-
property surfaces, respectively. Deterministic and
probabilistic equations are developed for the evolution
of the local properties of these surfaces. The local
geometry of regular surfaces is described by the surface
element properties: position; normal to the surface;
principal curvatures and directions; and, fractional area
increase. Exact evolution equations for these properties
are derived which reveal the effects of various process-
straining, and surface propagation, for example. For
material surfaces and simple propagating surfaces these
equations are closed with respect to surface properties;
that is, given the velocity field, the equations can be
solved from specified initial conditions. The
circumstances that can lead to a breakdown of regularity
of an initially regular surface are determined. Keywords:
Turbulent flames, Surfaces, Reprints. (Jnd)

DESCRIPTORS: (U) *TURBULENT DIFFUSION, *FLAMES, *FLAME

AD-A198 368

AD-A198 368

UNCLASSIFIED

PAGE 192

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 332 7/3

AD-A198 332 CONTINUED

CORNELL UNIV ITHACA NY DEPT OF CHEMISTRY

SURFACES, TRANSITIONS, VECTOR ANALYSIS, VELOCITY.

(U) Vector Correlations in the Photodissociation of CH₃I,
OCS, and Glyoxal,

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

88 9P

PERSONAL AUTHORS: Hall, G. E.; Loo, R. O.; Harri, H.-P.;
Sivakumar, N.; Chawla, G. K.

CONTRACT NO. AFOSR-88-0017

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0865

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Berichte der Bunsen-
Gesellschaft fuer Physikalische Chemie, v92 p281-288 1988.

ABSTRACT: (U) The use of vector correlations to elucidate the photodissociation dynamics of CH₃I, OCS, and glyoxal is discussed. The correlations occur between the vectors E, the electric vector of the photolysis light, mu, the transition dipole moment of the parent, v, the relative recoil velocity of the fragments, and J, the angular momentum of one of the fragments. The E - mu - v correlation is illustrated by a direct imaging technique in the photodissociation of CH₃I; it shows that dissociation takes place by a parallel transition and is rapid compared to parent rotation. The triple vector correlation, E - mu - (v-J), is used to show that the dissociation of OCS proceeds on two surfaces, one of A' and one of A' symmetry in the Cs point group. The v-J correlation in the dissociation of glyoxal illustrates two points, that dissociation of this molecule takes place in a plane and that vector correlations can exist even for dissociations which are slow compared to parent rotation. Reprints. (mjm)

DESCRIPTORS: (U) *DISSOCIATION, *PHOTOLYSIS, *IODIDES, *METHYL RADICALS, *SULFUR OXIDES, *ALIPHATIC HYDROCARBONS, ANGULAR MOMENTUM, CORRELATION, DIPOLE MOMENTS, IMAGES, LIGHT, PARALLEL ORIENTATION, RECOIL, REPRINTS, ROTATION,

AD-A198 332

AD-A198 332

UNCLASSIFIED

PAGE 193

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 331 7/2 10/8

AD-A198 331 CONTINUED

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB
OF CHEMICAL PHYSICS

IDENTIFIERS: (U) PE81102F, WJAFOSR230383.

(U) Photoionization of the Valence Orbitals of OH,

FEB 88 7P

PERSONAL AUTHORS: Stephens, J. A.; McKoy, V.

CONTRACT NO. AFOSR-86-0038, SNSF-CHE85-21381

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0922

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v88
n3 p1737-1742, 1 Feb 88.

ABSTRACT: (U) There has been only a limited amount of experimental investigation of the photoabsorption and photoionization processes of the OH radical. In this paper, we present ab initio calculations of photoionization cross sections and photoelectron angular distributions for the 3 sigma and 1 pi levels of OH, corresponding to the formation of the first five accessible states of OH+. The photoionization dynamics of this important diatomic molecule does not appear to have been previously studied theoretically. Likewise, there are no measurements of absolute partial photoionization cross sections or angular distributions available for direct comparison with the present calculations. We hope the present work will stimulate further theoretical and experimental investigation of the photoionization of OH. Furthermore, these single-photon ionization studies are a first step in our planned studies of the resonant multiphoton ionization of OH, an important radical in molecular photofragmentation. Reprints. (jes)

DESCRIPTORS: (U) *DIATOMIC MOLECULES, *PHOTOCHEMICAL REACTIONS, *PHOTOIONIZATION, ANGLES, COMPARISON, CROSS SECTIONS, DISTRIBUTION, DYNAMICS, FRAGMENTATION, IONIZATION, MOLECULES, PHOTOELECTRONS, PHOTONS, REPRINTS, RESONANCE, HYDROXYL RADICALS.

AD-A198 331

AD-A198 331

UNCLASSIFIED

PAGE 194

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 330 7/5 20/5

AD-A198 330 CONTINUED

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB
OF CHEMICAL PHYSICS

(U) Ionic Rotational Branching Ratios in Resonant Enhanced
Multiphoton Ionization of NO Via the A 2Sigma + (3s
sigma) and D 2Sigma + (3p sigma) States.

JAN 88

PERSONAL AUTHORS: Rudolph, H.; Dixit, S. N.; McKay, V.;
Huo, W. W.

CONTRACT NO. AFOSR-86-0039

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0928

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v88
n2 p637-641, 15 Jan 88.

ABSTRACT: (U) We present the results of ab initio calculations of the ionic rotational branching ratios in nitric oxide for a (1+1) REMPI (resonant enhanced multiphoton ionization) via that A 2 sigma (+) 3s sigma state and a (2+1). REMPI via the D 2 sigma (+) 3p sigma state. Despite the atomic-like character of the bound 3p sigma orbitals in these resonant states, the photoelectron continuum exhibits strong l mixing. The selection rule implies that the peaks in the photoelectron spectrum corresponding to Delta N = odd are sensitive to even partial waves while those corresponding to even Delta N probe the odd partial waves in the photoelectron continuum. High resolution photoelectron studies have shown a strong Delta N = 0 peak for ionization via the A 2 sigma (+) and the D 2 sigma (+) states, indicating a dominance of odd-l partial waves. While this seems natural for ionization out of the 3s sigma orbital, it is quite anomalous for 3p sigma ionization. Viswanathan attribute this anomaly to a strong l mixing in the electronic continuum caused by the nonspherical molecular potential. The electronic continuum shows a significant p-wave component which

leads to the large Delta N = 0 peak in both cases. Calculations are performed for both rotationally clean and mixed branches. The relative heights of the peaks are very sensitive to the photoelectron kinetic energy for the D 2 sigma (+) state and less so for the A 2 sigma (+) state. This is a direct consequence of the l mixing in the continuum. Reprints. (aw)

DESCRIPTORS: (U) *PHOTOIONIZATION, *NITROGEN OXIDES, ELECTRONIC STATES, HIGH RESOLUTION, KINETIC ENERGY, MOLECULES, NITROGEN OXIDES, PHOTOELECTRONS, PROBES, REPRINTS, WAVES, PHOTOELECTRON SPECTRA, IONS, ROTATION.

IDENTIFIERS: (U) Multiphoton ionization, PE81102F, WUAFOSR2303B3.

AD-A198 330

AD-A198 330

UNCLASSIFIED

PAGE 195

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 329 7/5

AD-A198 329 CONTINUED

CALIFORNIA INST OF TECH PASADENA DEPT OF CHEMISTRY

(U) Time Dependent Absorption of Fragments During
Dissociation.

88 8P

PERSONAL AUTHORS: Bersohn, R.; Zevail, A. H.

CONTRACT NO. AFDSR-87-0071

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR
TR-88-0815

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Berichte der Bunsen-
Gesellschaft fuer Physikalische Chemie, v92 p373-378 1988.

ABSTRACT: (U) Excitation of an electron in a molecule often switches the interaction between a pair of atoms from a strong (bonding) attraction to a strong (antibonding) repulsion. The result is a rapid breaking of the bond between the two atoms. The process is so rapid that it has generally been considered instantaneous and therefore unmeasurable. The breaking of the bond is not instantaneous however and the time required can be estimated in order of magnitude. A typical speed attained during dissociation might be approx. 100,000 cm/s, and if the bond is extended by 2×10^{-8} to the -8 power cm, it can be considered to be broken. Now that light pulses shorter than this time can be generated, one can measure in real time the rate of this direct bond breaking. The first such experiment, carried out on cyanogen iodide, has recently been reported. The development of methods of generation of very short pulses of light with widths about or below 100 fs has enabled the measurement of the rate of direct photodissociation of a bond. The experiment measures absorption as a function of both time and the degree to which the probing light is off resonance with one of the fragments. A classical model with an exponential repulsion is used to relate experimental observables to the dissociation time and properties of the potential surface. The delicateness of

AD-A198 329

UNCLASSIFIED

AD-A198 329

PAGE 108

EVJ00F

the probe will improve as the photon energy approaches the threshold energy for dissociation. Reprints. (aw)

DESCRIPTORS: (U) *CYANOGEN, *IODIDES, *PHOTODISSOCIATION, ABSORPTION, ATOMS, ELECTRONS, ENERGY, FRAGMENTS, LIGHT PULSES, PHOTONS, REAL TIME, REPRINTS, RESONANCE, SHORT PULSES, SURFACES, THRESHOLD EFFECTS, TIME, TIME DEPENDENCE, CHEMICAL BONDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230381

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 328 7/4 20/5

AD-A198 327 7/3

CALIFORNIA INST OF TECH PASADENA DEPT OF CHEMISTRY

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Ultrafast Laser Spectroscopy of Chemical Reactions,
88 12P

(U) (Dialkylamino)phosphorus Metal Carbonyls. 5. Chemical
Reactivity of the Phosphorus-Bridging Carbonyl Group
in Carbonylbis(dialkylamino)phosphido
hexacarbonyldiiron(1-4).

PERSONAL AUTHORS: Kree, Joseph L.; Zewail, Ahmed H.

DESCRIPTIVE NOTE: Journal article,

CONTRACT NO. AFOSR-87-0071, \$NSF-DMR85-21191

88 10P

PROJECT NO. 2303

PERSONAL AUTHORS: King, R. B.; Wu, F.-J.; Holt, E. M.

TASK NO. 81

CONTRACT NO. AFOSR-84-0050

MONITOR: AFOSR
TR-88-0817

PROJECT NO. 2303

UNCLASSIFIED REPORT

TASK NO. 812

MONITOR: AFOSR
TR-88-0880

SUPPLEMENTARY NOTE: Pub. in Spectroscopy, v3 n5 p44-53
1988.

UNCLASSIFIED REPORT

ABSTRACT: (U) Ultrafast laser spectroscopy has extended
reaction-dynamic studies into the picosecond and
femtosecond time domain, allowing for experimental
observations of transitory fragments that occur during
collision or half-collision. This ability to observe
molecular reactions allows real-time viewing of energy
redistributions, measurements of state-to-state rates,
and tests of microscopic statistical theories as
prescribed by potential energy surface (PES)
considerations. In this article, the focus is on
unimolecular reactions. Recent advances in the studies of
oriented biomolecular reactions and transitions states of
elementary reactions are also briefly considered.
Reprints. (aw)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *MOLECULES,
*SPECTROSCOPY, BIOMOLECULES, HIGH RATE, LASERS,
MICROSCOPY, MOLECULAR PROPERTIES, POTENTIAL ENERGY,
REACTION KINETICS, REPRINTS, STATISTICS, SURFACES, THEORY,
TIME DOMAIN, BIOMOLECULES, LASER APPLICATIONS, COLLISIONS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B1.

AD-A198 328

UNCLASSIFIED

PAGE 197

FVJ00F

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical
Society, v110 n9 p2775-2782 1988.

ABSTRACT: (U) Recent results from our laboratory have
shown that the reaction of (i-Pr)₂NPCl₂ with NaFe(CO)₄ in
diethyl ether solution provides a source of the
phosphorus-bridging carbonyl complex thereby making this
air-stable complex readily available in 40-g quantities.
This complex can be regarded as a novel analogue of a
ketone in which the carbonyl group is bonded to two
phosphorus atoms rather than two carbon atoms.
Furthermore, the ready availability and stability of this
complex provide an unprecedented opportunity for
investigating the chemical reactivity of this unusual
functionality. This paper presents some details on our
studies of the chemical reactivity of this carbonyl
complex. Reprints. (jes)

DESCRIPTORS: (U) *KETONES, *METAL CARBONYLS, ATOMS,
CARBON, CHEMICAL REACTIONS, ETHERS, ETHYL RADICALS,
PHOSPHORUS, REACTIVITIES, REPRINTS, SOLUTIONS(GENERAL).

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B2, DIALKYLAMINO
PHOSPHOROUS METAL CARBONYLS.

AD-A198 327

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 326

7/2

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Diffusion of H Atoms on a Si(111) Surface with Partial Hydrogen Coverage: Monte Carlo Variational Phase-Space Theory with Tunneling Correction.

JUN 88

13P

PERSONAL AUTHORS: Rice, Betsy M.; Raff, Lionel M.; Thompson, Donald L.

CONTRACT NO. AFOSR-88-0043

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0809

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in J. of Chemical Physics, v88 n11 p7221-7231, 1 Jun 88.

ABSTRACT: (U) The diffusion of hydrogen atoms on partially hydrogen-covered Si(111) surface has been studied by using Monte Carlo techniques with a potential-energy surface based on the available ab initio results and experimental data. The potential describes two kinds of binding sites, a covalent Si-H bond (top site) and an interstitial threefold bonding site (open site). Classical jump frequencies between the top and open sites were calculated using Monte Carlo variation phase-space theory with importance sampling at 300, 600, 900, and 1200 K. Reprints. (jes)

DESCRIPTORS: (U) *HYDROGEN, *TUNNELING, ATOMS, BINDERS, BONDING, CORRECTIONS, DIFFUSION, EXPERIMENTAL DATA, FREQUENCY, MONTE CARLO METHOD, REPRINTS, SITES.

IDENTIFIERS: (U) PE811024, WUAFOSR2303B3.

AD-A198 326

AD-A198 324 20/5 7/2

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) The Chemistry of Water in Ambient-Temperature Chloroaluminate Ionic Liquids: NMR Studies.

87

8P

PERSONAL AUTHORS: Zawodzinski, Thomas A., Jr.; Osteryoung, R. A.

CONTRACT NO. AFOSR-87-0088

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0888

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Joint International Symposium on Molten Salts, v87-7 p408-413 1987.

ABSTRACT: (U) NMR spectroscopy has been used to study the species formed upon addition of water room-temperature molten salts composed of mixtures of AlCl₃ with 1-methyl, 3-ethyl imidazolium chloride (ImCl) at various mole ratios. In basic melts, a single resonance peak is observed; in acidic melts, 3 separate peaks are observed and the nature of the various sites can be deduced. NMR has been employed to study the chemistry of protons in these melts. DCI interacts with a second chloride ion in basic melts whereas it interacts only weakly in acidic melts. (jes)

DESCRIPTORS: (U) *CHLORIDES, *NUCLEAR MAGNETIC RESONANCE, *SPECTROSCOPY, ACIDS, FUSED SALTS, IONS, MELTS, PEAK VALUES, PROTONS, RESONANCE, ROOM TEMPERATURE, SPECTROSCOPY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2.

AD-A198 324

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY. SEARCH CONTROL NO. EVJOOF

AD-A198 323 CONTINUED

AD-A198 323 7/6 20/5

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Simultaneous EPR (Electron Paramagnetic Resonance)
Electrochemical Measurements on Polypyrrole in Ambient
Temperature Ionic Liquids.

88 16P

PERSONAL AUTHORS: Oudard, J. F.; Allendoerfer, R. D.;
Osteryoung, R. A.

CONTRACT NO. AFOSR-87-0088

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-88-0869

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Electroanalytic
Chemistry. v241 p231-246 1988.

ABSTRACT: (U) EPR, current and charge measurements have
been made simultaneously (a) vs. potential during linear
scan experiments and (b) vs. time during
chronoamperometric experiments on a polypyrrole film in
an ambient temperature molten salt consisting of 1-methyl-
3-ethyl-imidazolium chloride + aluminum chloride. The
linear scan experiments show an EPR absorption over a
very narrow potential region, about 200 mV, and a strong
correlation between the maximum EPR absorption and the
peak current. Chronoamperometric experiments show that
equilibrium is achieved after 10-15 s. and that the
paramagnetic species (radical cation) is necessarily an
intermediate in the process of switching the film from
its neutral to fully oxidized state, or the reverse. The
characteristics of the EPR signal are reported. Keywords:
Electroactive, Conducting polymers, Chloroaluminates,
Electrochemistry. Reprints. (jes)

DESCRIPTORS: (U) *ELECTRON PARAMAGNETIC RESONANCE,
*POLYMERS, ABSORPTION, CATIONS, ELECTRIC CURRENT,
ELECTROCHEMISTRY, FILMS, LINE SCANNING, MEASUREMENT,
MELTS, OXIDATION, PARAMAGNETISM, PEAK POWER, PYRROLES,
REGIONS, REPRINTS, SALTS, TEMPERATURE.

IDENTIFIERS: (U) PE81102F, WUAFOSR230382, ELECTRON
PARAMAGNETIC RESONANCE.

AD-A198 323

AD-A198 323

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 321 12/3

AD-A198 321 CONTINUED

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

SIZES(DIMENSIONS), STATISTICAL INFERENCE, SYMPOSIA,
VISIBILITY.

(U) Weighted and Clouded Distributions.

DESCRIPTIVE NOTE: Technical rept..

IDENTIFIERS: (U) PE81102F, WUAFUSR2304A8

FEB 88 41P

PERSONAL AUTHORS: Rao, C. R.

REPORT NO. TR-88-01

CONTRACT NO. AFOSR-88-0030

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-88-0788

UNCLASSIFIED REPORT

ABSTRACT: (U) The concept of weighted distributions can be traced to the study of effects of methods of ascertainment upon the estimation of frequencies by Fisher in 1934. It was formulated in general terms by the author in a paper presented at the First International Symposium on Classical and Contagious Distributions held in Montreal in 1963. Since then a number of papers have appeared on the subject. This article reviews the previous work and the current developments with some examples. Weighted distributions occur in a natural way when adjustments have to be made in the original probability distribution due to deviations from simple random sampling in collecting data, as when the events that occur do not have the same chance of coming into the sample. The examples include: p.p.s (probability proportional to size) sampling in sample surveys, damage models, visibility bias in quadrat sampling in ecological studies, sampling through affected individuals in genetic studies, waiting time paradox and so on. Keywords: Statistical inference, Truncation. (kr)

DESCRIPTORS: (U) *PROBABILITY DISTRIBUTION FUNCTIONS, *WEIGHTING FUNCTIONS, BIAS, DAMAGE, DATA ACQUISITION, DISTRIBUTION, ECOLOGY, ESTIMATES, FREQUENCY, GENETICS, INTERNATIONAL, MODELS, PROBABILITY, SAMPLING.

AD-A198 321

AD-A198 321

UNCLASSIFIED

PAGE 200

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 320 7/3

AD-A198 320 CONTINUED

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Synthesis of New Polynitropolyhedranes.

METHODOLOGY, MOLECULES, PRODUCTION CONTROL, RINGS,
STABILITY, SYNTHESIS(CHEMISTRY).

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 84-31 Mar
88,

IDENTIFIERS: (U) PE61102F, WUAFOSR230382,
*Polynitropolyhedranes, *Cubanes.

JUL 88 36P

PERSONAL AUTHORS: Marchand, Alan P.

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR
TR-88-0915

UNCLASSIFIED REPORT

ABSTRACT: (U) A significant portion of our overall research program has been concerned with the synthesis and chemistry of novel, strained polycyclic 'cage' hydrocarbon systems. The objective of our AFOSR-sponsored research program is to extend our earlier interests in the pentacyclo 5.4.0.02.6.03, 10.05,9 undecane (PCUD) and pentacyclo 5.4.0.02.5.03, 8.04,8 decane (1,3-bisnornorbornane) ring systems to include the syntheses of new polynitro derivatives of these molecules. We seek new ways to incorporate increasing numbers of NO₂ groups into novel cage molecules with the ultimate goal of synthesizing a fully penetrated cage molecule, Cn(NO₂)m. Our approach to these syntheses involves introducing increasing numbers of NO₂ groups into a given cage system by employing a logical progression of increasingly functionalized synthetic intermediates. Thus, we are able to gauge the cumulative effects of increasing substitution (particularly NO₂ substitution) upon product stability and upon the relative ease of product-forming reactions in a gradual and orderly fashion. Importantly, such approaches represent entirely new synthetic methodology for incorporating large numbers of NO₂ substituents into novel, strained systems. Keywords: Cyclic compounds, Cubanes, Decanes. (NMM)

DESCRIPTORS: (U) *CYCLIC COMPOUNDS, *DECANES, CHEMISTRY,

AD-A198 320

AD-A198 320

UNCLASSIFIED

PAGE 20

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 319 7/3

AD-A198 318 14/2 9/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

PURDUE UNIV LAFAYETTE IN

(U) Structure of a Bis(eta4-exocyclic-1,3-diene)Fe(CO)3 Complex,

(U) Pump/Probe Method for Fast Analysis of Visible Spectral Signatures Utilizing Asynchronous Optical Sampling.

88 4P

OCT 87 8P

PERSONAL AUTHORS: Watson, William H.; Nagl, Ante; Marchand, Alan P.; Chenera, Brian

PERSONAL AUTHORS: Elsinga, Paul A.; Kneisler, Ronald J.; Lytle, Fred E.; Jiang, Yanan; King, Galen B.

CONTRACT NO. AFOSR-84-0085, SNSF-CHE85-14367

CONTRACT NO. AFOSR-84-0323

PROJECT NO. 2303

PROJECT NO. 2308

TASK NO. 82

TASK NO. A2

MONITOR: AFOSR TR-88-0919

MONITOR: AFOSR TR-88-0802

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Crystallographica C, v44 p808-808 1988.

SUPPLEMENTARY NOTE: Pub. in Applied Optics, v28 n19 p4303-4308, 1 Oct 87.

ABSTRACT: (U) The single crystal X ray structure of a bis (eta4-exocyclic-1,3-diene)Fe(CO)3 complex, which was formed via Fe(CO)5-promoted coupling of 2,3-bis(acetoxymethyl)norbornadiene to carbon monoxide, is reported. Keywords: X ray crystallography, Dimer, Ketone, Dienes, Iron compounds, Reprints. (mjm)

ABSTRACT: (U) We report the results from a new pump/probe spectrometer for potential use in combustion diagnostics that employs asynchronous optical sampling. The instrument consists of two frequency-doubled mode-locked Nd:YAG lasers operating at slightly different repetition rates, synchronously pumping two dye lasers (rhodamine 6G) to generate the pump and probe beams. The spectral and temporal capabilities of the instrument are examined by obtaining a spectrum and an excited state decay of rhodamine B. The instrument response is shown to be proportional to pump power, probe power, and sample absorbance. Different frequency synthesizers and different modes of triggering are used to study their effect on signal stability. Spectroscopy, Pump Probe, Asynchronous optical sampling. Reprints. (mjm)

DESCRIPTORS: (U) *DIENES, *IRON COMPOUNDS, *KETONES, CARBON MONOXIDE, CRYSTALLOGRAPHY, REPRINTS, X RAYS.

IDENTIFIERS: (U) PE81102F, WUAFOSR230382, *Diene/bis-eta4-exocyclic-1,3.

DESCRIPTORS: (U) *COMBUSTION, *DIAGNOSIS(GENERAL), *DYE LASERS, *LASER PUMPING, *MODE LOCKED LASERS, *YAG LASERS, ABSORPTION, ASYNCHRONOUS SYSTEMS, DECAY, FREQUENCY MULTIPLIERS, FREQUENCY SYNTHESIZERS, INSTRUMENTATION, OPTICAL PROPERTIES, POWER, PROBES, REPETITION RATE, REPRINTS, RESPONSE, SAMPLING, SIGNALS, SPECTROMETERS, SPECTROSCOPY, SPECTRUM SIGNATURES, STABILITY, VISIBLE

AD-A198 319

AD-A198 318

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 318 CONTINUED

AD-A198 317 12/2

SPECTRA.

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER
ENGINEERING

IDENTIFIERS: (U) PEG1102F, WUAFOSR2308A2, *Rhodamine B.

(U) Affine-Feedback Stabilization of Piecewise-Linear
Hypersurface Systems.

DEC 87 7P

PERSONAL AUTHORS: Lee, Kyun K.; Arapostathis, Aristotile

CONTRACT NO. AFOSR-88-0029, NSF-ECS84-12100

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0808

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Conference
on Decision and Control (28th), p136-141 Dec 87.

ABSTRACT: (U) The problem is addressed of feedback
stabilization by affine control of piecewise-linear
(hypersurface) systems, which are defined as control
systems that are subject to affine dynamics on each of
the components of a finite polyhedral partition. The
results relate the concepts of stabilizability and
controllability for the above systems. Keywords:
piecewise linear systems, Feedback stabilization,
Reprints. (Jhd)

DESCRIPTORS: (U) *CONTROL SYSTEMS, *FEEDBACK, LINEAR
SYSTEMS, REPRINTS, STABILIZATION.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A1

AD-A198 318

AD-A198 317

UNCLASSIFIED

PAGE 203

EVJ00F

UNCLASSIFIED

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SEARCH CONTROL NO. EVJ00F

AD-A198 318 12/1

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER
ENGINEERING(U) On the Immersion of a Discrete Time Nonlinear System
into a Linear System.

DEC 87 7P

PERSONAL AUTHORS: Lee, Hong-Gi; Marcus, Steven I.

CONTRACT NO. F49620-85-C-0045, \$AFOSR-86-0029

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0808

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the Conference
on Decision and Control (28th), p1748-1751 Dec 87.

ABSTRACT: (U) We consider a discrete time nonlinear system of the form $\sigma(x(t+1)) = f(x(t), u(t)) y(t) = h(x(t))$ where x is the state, u is the input, y is the output, f and h are analytic vector valued functions. Necessary and sufficient conditions for immersion of the system σ into a linear system are given. Also, we define local immersion by nonsingular feedback into a linear system and give necessary and sufficient conditions for this problem. Finally, we show that a similar approach can also be applied to continuous time affine nonlinear systems. Keywords: Immersion, Nonlinear systems, Linearization, Reprints. (mjm)

DESCRIPTORS: (U) *LINEAR SYSTEMS, *LINEARITY, *NONLINEAR SYSTEMS, IMMERSION, REPRINTS, TIME.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A1.

AD-A198 318

AD-A198 315 12/4

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS
(U) Nonparametric Estimation of Optimal Performance
Criteria in Quality Engineering.

DESCRIPTIVE NOTE: Technical rept. no. 8, Aug 87-Aug 88.

AUG 88 28P

PERSONAL AUTHORS: Carroll, R. J.; Hall, Peter

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-88-0839

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with
Australian National Univ., Canberra, Dept. of Statistics.

ABSTRACT: (U) Box (1987) and Leon et al. (1987) discuss the problem of closeness to target in quality engineering. If the mean response $f(x, z)$ depends on (x, z) , the variance function is a PERMA if it is $g(z)$, i.e., it depends only on z . The goal is to find (x, z) which minimizes variance while achieving a target mean value. The authors pose and answer the question: for given smoothness assumptions about f and g , how accurately can we estimate x sub o and z sub o ? As part of the investigation, they also find optimal rates of convergence for estimating f, g and their derivatives. Keywords: Nonparametric regression, Performance measure, Quality control, Variance function estimation, Quality engineering. (kr)

DESCRIPTORS: (U) *NONPARAMETRIC STATISTICS, *ESTIMATES, OPTIMIZATION, ANALYSIS OF VARIANCE, QUALITY CONTROL.

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A6.

AD-A198 315

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F
AD-A198 314 CONTINUED

AD-A198 314 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

processes.

(U) On Exceedance Point Processes for Stationary Sequences under Mild Oscillation Restrictions.

DESCRIPTIVE NOTE: Technical rept. no. 230, Sep 87-Aug 88,

APR 88

PERSONAL AUTHORS: Leadbetter, M. R.; Nandagopalan, S.

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0838

UNCLASSIFIED REPORT

ABSTRACT: (U) It is known that any point process limits for the (time normalized) exceedances of high levels by a stationary sequence is necessarily Compound Poisson, under general dependence restrictions. This results from the clustering of exceedances where the underlying Poisson points represent cluster positions, and the multiplicities correspond to cluster sizes. A class of stationary sequences satisfying a mild local dependence condition restricting the extent of local rapid oscillation is investigated. For this class, criteria are given for the existence and value of the so-called extremal index which plays a key role in determining the intensity of cluster positions. Cluster size distributions are investigated for this class and in particular shown to be asymptotically equivalent to those for lengths of runs of consecutive exceedances above the level. Relations between the point processes of exceedances, cluster centers, and upcrossings are discussed. (jhd)

DESCRIPTORS: (U) *POISSON DENSITY FUNCTIONS, CLUSTERING, DISTRIBUTION, INTENSITY, LENGTH, LIMITATIONS, OSCILLATION, SEQUENCES, SIZES(DIMENSIONS), STATIONARY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, Stationary

AD-A198 314

AD-A198 314

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 313

4/1 20/6

AD-A198 313 CONTINUED

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF
METEOROLOGY

(U) Long Term Studies of the Refractive Index Structure
Parameter in the Troposphere and Stratosphere.

DESCRIPTIVE NOTE: Final rept. Nov 85-Apr 88.

88

PERSONAL AUTHORS: Fairall, C. W.; Thomson, D. W.; Syrett,
W. J.

CONTRACT NO. AFOSR-88-0048

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
YR-88-0778

UNCLASSIFIED REPORT

ABSTRACT: (U) This project studied the relation of meteorological conditions to parameters and processes that influence the optical propagation properties establishment of a climatology of refractive index structure function parameter as measured with a network of doppler radars. The relation of the atmospheric turbulence profile to the synoptic context and physical models to predict the profile using standard meteorological profile data was also being investigated. The study features two modes of data archiving: (1) continuous archiving of 1 hr average wind profiles and turbulence levels, and (2) high time resolution measurements in association with other measurements (ground-based optical scintillometers, aircraft or radiosondes). The atmospheric turbulence profiles and resultant optical propagation parameters have been found to be strongly influenced by synoptic conditions. In particular, the turbulence was substantially affected by to strength and location of the jetstream. A very strong correlation between wind shear (which was maximum above and below the core of the jet) and pilot reports of turbulence was found. Richardson number gave a much weaker indication, possibly because of the poorer quality of the vertical temperature gradient data. A study of the

AD-A198 313

UNCLASSIFIED

PAGE 202

EVJ00F

ratio of temperature to velocity microturbulence showed that the assumption of a constant mixing efficiency (used in the Van Zandt model) may not be valid for very weak turbulence. (jhd)

DESCRIPTORS: (U) *LIGHT TRANSMISSION, *REFRACTIVE INDEX, *TURBULENCE, AIRCRAFT, ATMOSPHERES, ATMOSPHERIC MOTION, CLIMATOLOGY, DOPPLER RADAR, EFFICIENCY, LOW STRENGTH, MEASUREMENT, METEOROLOGICAL DATA, METEOROLOGY, MIXING, RADAR REFLECTIONS, MODELS, NETWORKS, PARAMETERS, PHYSICAL PROPERTIES, PILOTS, PROFILES, RADIOSONDES, RATIOS, REPORTS, RESOLUTION, STRATOSPHERE, TEMPERATURE, TEMPERATURE GRADIENTS, TIME, TROPOSPHERE, VERTICAL ORIENTATION, WIND, WIND SHEAR.

IDENTIFIERS: (U) PE81102F, MUAFOSR2310A1, Richardson number.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 305 CONTINUED

POLYMERIC FILMS, ACETYLENES, LIQUID CRYSTALS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3

AD-A198 305 20/6 7/3 7/6
POLYTECHNIC UNIV BROOKLYN NY(U) Organic and Polymeric Nonlinear Optical Materials; a
Topical Workshop Held in Virginia Beach, Virginia on
May 18-19, 1988.

DESCRIPTIVE NOTE: Final rept.,

JUL 88 140P

PERSONAL AUTHORS: Bergl, Diana J.; Tripathy, Sukant K.

CONTRACT NO. AFOSR-88-0221

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0718

UNCLASSIFIED REPORT

ABSTRACT: (U) At this Workshop on Organic and Polymeric Nonlinear Optical Materials, the latest developments in the areas of theory, characterization, synthesis, molecular assemblies, and potential device applications for organic and polymeric materials exhibiting nonlinear optical behavior are discussed. Topics discussed include: An Overview on Nonlinear Optical Polymer Systems and Devices, Nonlinear Optical Effects in Polymeric Films, Recent Advances in Nonlinear Optical Properties of Organic and Polymer Systems, Anisotropy of the Third Order Nonlinear Optical Susceptibility in Conjugated Polymers, Nonlinear Optics in Ordered Molecular Systems, Several Series of Novel Polydiacetylenes for Nonlinear Optics, Resonance Effects in Cubic Hyper-polarisabilities of Conjugated Polymers, Nonlinear Optical Measurements on Liquid Crystals and Quasi-Liquid Crystals, Optical Nonlinearity: Molecules, Assemblies and Wave Phenomena, Preparation and Characterization of Organo-Transition Metal Langmuir-Blodgett Films, Advances in Organic Electro-Optic Devices, Organic Nonlinear Optical Devices and Material Considerations, High Resolution Laser Spectroscopy in Polymers. (aw)

DESCRIPTORS: (U) *OPTICAL MATERIALS, *POLYMERS, ORGANIC MATERIALS, SYNTHESIS(CHEMISTRY), MOLECULAR STRUCTURE.

AD-A198 305

AD-A198 305

UNCLASSIFIED

PAGE 20

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 298 CONTINUED

AD-A198 298 6/15 5/8 6/4

HAHNEMANN MEDICAL COLL AND HOSPITAL PHILADELPHIA PA DEPT
OF PHYSIOLOGY AND BIO PHYSICS

LEVARTERENDOL, NERVE CELLS, ORGANIZATIONS, PHYSIOLOGY,
RATS, SEROTONIN, STIMULATION(GENERAL), TOPOGRAPHY,
CONDITIONED RESPONSE.

(U) The Role of Central Monoamine and Serergic Systems in Arousal
and Selective Attention.

IDENTIFIERS: (U) *AROUSAL.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 87-31 Mar 88.

JUL 88 10P

PERSONAL AUTHORS: Waterhouse, Barry D.

CONTRACT NO. AFOSR-87-0138

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-0811

UNCLASSIFIED REPORT

ABSTRACT: (U) The work described here is part of an ongoing set of studies aimed at characterizing the physiological actions and anatomical organization of the monoaminergic projection systems to the rat cerebral cortex, cerebellum and hypothalamus. The underlying theme of this work is that the endogenous monoamines, norepinephrine (NE) and serotonin (5-HT), serve to modulate central neuronal responsiveness to afferent synaptic inputs and by so doing participate in the cognitive process of selective attention. Specifically, individual studies describe: 1) the effects of NE and 5-HT on rat visual and somatosensory cortical neuron responses to afferent pathway stimulation, 2) topographic organization of the neocortical projection neurons in the serotonergic dorsal raphe nucleus, 3) pharmacological characterization of NE effects in rat lateral hypothalamus and 4) similarity between the modulatory actions of NE and stimulant drugs, cocaine and amphetamine. Keywords: Monoamines, Norepinephrine, Serotonin (5-HT), Selective attention, Cerebral cortex, Cerebellum, hypothalamus, Electrophysiology. (sdw)

DESCRIPTORS: (U) *AMINES, *COGNITION, *NEUROPHYSIOLOGY,
*ATTENTION, AMPHETAMINES, ANATOMY, CEREBELLUM, CEREBRAL
CORTEX, COCAINE, ELECTROPHYSIOLOGY, HYPOTHALAMUS.

AD-A198 298

AD-A198 298

UNCLASSIFIED

PAGE 208

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 297 7/2 7/4

AD-A198 297 CONTINUED

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Dynamics of Chemisorption/Scattering of Atomic Hydrogen on Partially Covered Si(111) Surfaces.

88 43P

DESCRIPTORS: (U) *CHEMISORPTION, *HYDROGEN, *SCATTERING, *SILICON, ANGLE OF INCIDENCE, ANGLES, ATOMIC STRUCTURE, ATOMS, AZIMUTH, BINDERS, DEFLECTION, DYNAMICS, EXCHANGE, IMPACT POINT, INTERSTITIAL, REPRINTS, SITES, TARGETS, TRAJECTORIES.

PERSONAL AUTHORS: Rice, Betsy M.; Raff, Lionel M.; Thompson, Donald L.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303B3.

CONTRACT NO. AFOSR-86-0043

PROJECT NO. 2303

TASK NO. 83

MONITOR: AFOSR
TR-88-0827

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science v198 p380-389 1988.

ABSTRACT: (U) The chemisorption and scattering of atomic hydrogen from fully and partially covered Si(111) surfaces have been investigated using classical trajectory methods. Beam experiments were simulated for hydrogen atoms which had initial translational energy of 0.128 eV and three different azimuthal angles incident on a Si(111) surface. The effects of the surface with five different degrees of hydrogen-atom coverage were examined. The potential-energy surface used in this study is expressed as the sum of a lattice potential, a lattice-atom interaction potential, and a repulsive atom-atom potential. The lattice-atom interaction potential function accurately describes two binding sites on the Si(111) surface, a top binding site and an interstitial or open binding site. Presence of the interstitial or open site affects approach of hydrogen atoms to the surface by deflection of the trajectory from the target impact point. Direct scattering, exchange scattering, direct chemisorption, and chemisorption with exchange were observed. Indirect scattering via an absorbed state and hydrogen-atom migration on the surface were also observed. The probability of each process is dependent upon incidence angle and the degree of hydrogen-atom coverage present. Reprints. (mjm)

AD-A198 297

AD-A198 297

UNCLASSIFIED

PAGE 208

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 296 20/5

MICHIGAN UNIV ANN ARBOR DEPT OF ATMOSPHERIC AND OCEANIC SCIENCE

(U) Afocal Coupled Etalons. DEW: A High-Resolution Double-Etalon Modulator Spectrometer,

NOV 88 17P

PERSONAL AUTHORS: Hernandez, G.

CONTRACT NO. AFOSR-87-0174

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR TR-88-0828

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Optics, v28 n22 p4857-4869, 15 Nov 87.

ABSTRACT: (U) The properties of a spectroscopic device consisting of two etalons coupled by an afocal system, and which behaves as a high-luminosity single-etalon single-aperture Fabry-Perot spectrometer, have been investigated. Although the high luminosity behavior is one of the many states in which a coupled dual-etalon system can exist, mainly the high-luminosity condition has been studied in detail here. This condition is reached when the orders of the etalons comprising the device are related by $n \text{ sub } 01 = n \text{ sub } 02 / \eta$, where η is the coupling constant defined as $\eta = \mu_1 / \mu_2$ and μ_1 and μ_2 are the indices of refraction of the etalons. In high-luminosity conditions, one of the etalons serves as a multiple annuli mask for the other thus making it possible to use many of these annuli to achieve the desired high throughput. The limitation on the number of orders usable is given by the (small) nonlinearity in the matching of these orders, because of the different etalon gaps. The results of the study show that luminosity gains near 100 (when compared with a single-etalon single-aperture Fabry-Perot spectrometer) are possible at high resolving powers. This occurs when the coupling constant η is not too far from unity. It is

AD-A198 296

UNCLASSIFIED

PAGE 210

EVJ00F

AD-A198 296 CONTINUED

also shown that this device, or double-etalon modulator (DEM), is a compensated spectrometer since the gain increase with increasing resolving power. Other practical limitations, such as the beam walk-off from the edges of finite size etalons, are discussed. Reprints. (JHD)

DESCRIPTORS: (U) *FABRY PEROT INTERFEROMETERS, COUPLING(INTERACTION), EDGES, HIGH RATE, INDEXES, LENGTH, LENSES, LIMITATIONS, LUMINOSITY, NONLINEAR SYSTEMS, REFRACTION, REPRINTS, SIZES(DIMENSIONS), SPECTROSCOPY.

IDENTIFIERS: (U) PE81102F, WJAFOSR2310A2, *Afocal optical systems, Etalons.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 295 12/3

AD-A198 291 12/4

CITY COLL NEW YORK

BOEING COMPUTER SERVICES CO SEATTLE WA

(U) On a Correlation Inequality and Its Applications.

(U) Ordering Methods for Sparse Matrices and Vector Computers.

DESCRIPTIVE NOTE: Technical rept. Mar 87-Mar 88,

MAR 88

18P

DESCRIPTIVE NOTE: Final rept. no. 1, 1 Apr 87-31 Mar 88,

MAR 88

PERSONAL AUTHORS: Brown, Mark

PERSONAL AUTHORS: Lewis, John G.

REPORT NO. MB84-04

CONTRACT NO. AFOSR-84-0085

CONTRACT NO. F49820-87-C-0037

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A4

MONITOR: AFOSR, AFOSR

MONITOR: AFOSR

TR-88-0847, TR-84-04

TR-88-0787

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This document considers a continuous distribution on $(0, \infty)$ with cdf F , survival function \bar{F} ($\bar{F} = 1 - F$) and cumulative hazard function $H = -\ln \bar{F}$ ($\bar{F} = e^{-H}$). For F NBUE it is shown that the correlation coefficient between X and $H(X)$ is bounded below by $\delta(F)/\mu(F)$, the coefficient of variation of F , while for F NBUE the correlation coefficient is bounded below by $\mu(F)/\delta(F)$. Several applications of this inequality and its generalizations are discussed, including Monte-Carlo simulation of the renewal function, exponential approximation of DMRL distributions, moment inequalities for record values and a variance inequality for random event epochs in a homogeneous Poisson process.

DESCRIPTORS: (U) *CORRELATION, *INEQUALITIES, *POISSON EQUATION, COEFFICIENTS, DISTRIBUTION, FUNCTIONS, HOMOGENEITY, MOMENTS, MONTE CARLO METHOD, SIMULATION.

IDENTIFIERS: (U) PB81102F, WUAFOSR2304A5, Survival functions, Hazard functions.

AD-A198 295

AD-A198 291

UNCLASSIFIED

PAGE 211

EVJ00F

ABSTRACT: (U) Direct factorization methods for solving large sparse linear equations are used as fundamental building blocks for the numerical solution of many scientific and computational problems. It is well known that reordering the variables and equations is crucial in reducing the cost of performing direct solution techniques. The problem of finding the optimal reordering is known to be an NP-complete problem. As a result, practical reordering algorithms are heuristic, and their behavior is usually only known empirically. Different reordering heuristics have been developed in a number of different disciplines, reflecting the different types of sparse linear systems and different views of the cost of computing. This research has been concerned with furthering our understanding of how ordering heuristics and their companion numerical solution routines behave on high performance computers. The availability of such computers has led to a dramatic increase in the size and complexity of scientific computations. This is the arena in which better heuristics have the largest effect on the cost of scientific computing, but it is also an arena in which architectural constraints chosen for high speed often appear to conflict with sparsity. (KR)

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *SOLUTIONS(GENERAL), *SPARSE MATRIX, *FACTOR ANALYSIS.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 291 CONTINUED

AD-A198 290 12/3

ALGORITHMS, COMPUTATIONS, COSTS, EQUATIONS, HEURISTIC
METHODS, LINEAR SYSTEMS, MODULAR CONSTRUCTION, NUMERICAL
ANALYSIS, VECTOR ANALYSIS.

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL
ENGINEERING

(U) Robust Algorithms for Detecting a Change in a
Stochastic Process with Infinite Memory.

IDENTIFIERS: (U) WJAFOSR2304A4, PE61102F.

DESCRIPTIVE NOTE: Technical rept. 1 Jul 87-30 Jun 88,

MAR 88 11P

PERSONAL AUTHORS: Papantoni-Kazakos, P.; Bansal, Rakesh K.

REPORT NO. UVA/S25682/EE88/105

CONTRACT NO. AFOSR-87-0224

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0795

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors present and discuss a class of continuous operations on the family of discrete time stochastic processes, which serves as a guide to construct qualitatively robust operations for a given class of processes, namely the one induced by a nominal process and a substitutive contaminating process. The results are general enough to help develop any robust statistical procedure, but the authors have concentrated their attention on detection of a change from one class of processes to another (disjoint) class of processes, while both classes consist of not necessarily Markov processes and satisfy certain mixing conditions in addition to stationarity and ergodicity. Two quantitative measures of robustness, breakdown point and influence functions are also developed for few examples. (KR)

DESCRIPTORS: (U) *ALGORITHMS, *STOCHASTIC PROCESSES, ATTENTION, CONTAMINATION, CONTINUITY, DETECTION, MEMORY DEVICES, MIXING, OPERATION, TIME.

IDENTIFIERS: (U) WJAFOSR2304A5, PE61102F.

AD-A198 291

AD-A198 290

UNCLASSIFIED

PAGE 212

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 282 11/4 15/5

AD-A198 281 7/4 20/11 2/1

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

RENSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL
ENGINEERING

(U) Cumulative Damage Modelling in Composite Laminates.

DESCRIPTIVE NOTE: Final rept. 1 Jul 88-31 Dec 87.

FEB 88 43P

DESCRIPTIVE NOTE: Annual rept. 8 May 87-5 May 88.

PERSONAL AUTHORS: Sandhu, Ranbir S.; Sierakowski, Robert
L.; Wolfe, William E.PERSONAL AUTHORS: Petrakis, Emmanuel; Dobry, Ricardo; Ng,
Tang-Tat

REPORT NO. OSURF-718444-88-1

CONTRACT NO. AFOSR-86-0211

REPORT NO. RPI-CE-88-02

PROJECT NO. 2917

CONTRACT NO. AFOSR-88-0135

TASK NO. A1

PROJECT NO. 2302

MONITOR: AFOSR
TR-88-0903

UNCLASSIFIED REPORT

ABSTRACT: (U) Acquisition of laboratory equipment to enhance the capability of The Ohio State University for testing specimens and interrogating damage in advanced composite materials is described. The Air Force Equipment Grant complemented the support provided by The Ohio State University Office of Research and Graduate Studies and the College of Engineering. The report lists the equipment purchased under the AFOSR Grant as well as delineates the overall capability for advanced materials research made possible through the combined efforts of The Ohio State University and the Air Force. Keywords: Composites, Damage, Laboratory equipment, Laminates, Material testing. (jes)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *LAMINATES,
*DAMAGE, TEST EQUIPMENT, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PB81102F, WJAFOSR2917A1, OSURF-765471,
OSURF-718444.

AD-A198 282

UNCLASSIFIED

PAGE 213

EVJ00F

UNCLASSIFIED REPORT

ABSTRACT: (U) Granular soil is presented in this work by 2-D random arrays of elastic, rough, quartz sphere using the 'distinct element' method. The original 3-D computer code TRUBAL, originally developed by Peter Cundall, has been modified at RPI by the introduction of a general solution to the Hertz-Mindlin contact problem. This was achieved by attaching a subroutine to the original code, which describes the nonlinear force-displacement relationship at the intergranular contacts, by means of plasticity theory and kinematic hardening. The above modified program (CONBAL-2) developed as part of another RPI project, can perform 2-D simulations and has already been used to study the dynamic small strain behavior as well as the large strain behavior of sand. Keywords: Particulate mechanics, Random arrays, Spheres, Contact mechanics, Distinct element method, Isotropy, Anisotropy, Small strain, Wave velocity. (mjm)

DESCRIPTORS: (U) *ANISOTROPY, *ARRAYS, *NONLINEAR
SYSTEMS, *PARTICULATES, *SPHERES, DISPLACEMENT, ELASTIC
PROPERTIES, FORCE(MECHANICS), HARDENING, KINEMATICS,
MECHANICS, PLASTIC PROPERTIES, QUARTZ, SAND.

AD-A198 281

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 281 CONTINUED

AD-A198 279 13/12

SOLUTIONS(GENERAL), SUBROUTINES, THEORY, VELOCITY, WAVES.

CALIFORNIA UNIV DAVIS DEPT OF MECHANICAL ENGINEERING

IDENTIFIERS: (U) PE81102F, WUAFOSR2302C1.

(U) Extinction of Interacting Premixed Flames: Theory and Experimental Comparisons.

88 9P

PERSONAL AUTHORS: Chung, S. H.; Kim, J. S.; Law, C. K.

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0770

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Symposium (International) on Combustion (21st)/The Combustion Institute, p1845-1851 1986.

ABSTRACT: (U) The structure and extinction states of two interacting stretched premixed flames of unequal concentrations and distinct fuel, oxidizer and thermal diffusivities are analyzed. Results show that the extinction behavior depends critically on the effective Lewis numbers of the mixtures in that flames with large Lewis numbers interact weakly such that extinction mainly depends on the concentration of the stronger flame, while flames with small Lewis numbers interact strongly such that extinction depends on the concentration of both flames. Theoretical predictions identify the various extinction modes and satisfactorily explain the experimental results on the extinction boundaries of lean and rich methane/air and butane/air flames. Reprints. (jes)

DESCRIPTORS: (U) *FIRE SAFETY, BOUNDARIES, BUTANES, EXTINCTION, FLAMES, FUELS, INTERACTIONS, METHANE, MIXING, MIXTURES, NUMBERS, OXIDIZERS, PREDICTIONS, REPRINTS, THEORY, THERMAL DIFFUSION.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2.

AD-A198 281

AD-A198 279

UNCLASSIFIED

PAGE 214

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 278 7/5

AD-A198 278 CONTINUED

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB
OF CHEMICAL PHYSICS

IDENTIFIERS: (U) PEB110ZF, WUAFDSR2303B3.

(U) (1+1)CDAD: A New Technique for Studying Photofragment
Alignment.

MAY 87

PERSONAL AUTHORS: Dubs, Richard L.; Dixit, S. N.; McKoy,
V.

CONTRACT NO. AFOSR-87-0036

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0928

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v88
n10 p588-5887, 15 May 87.

ABSTRACT: (U) In recent years, the alignment of photofragments created by photodissociation of polyatomic molecules has been under intense investigation. Alignment information provides insight into the dynamics of the photodissociation process. Until now, fluorescence or LIF techniques (most often laser-induced fluorescence or LIF) have been used almost exclusively to determine the photofragment alignment. In this Comment we report a new method for probing photofragment alignment, namely, circular dichroism in the photoelectron angular distributions (CDAD). Most importantly, we demonstrate here that the photofragment alignment can be extracted from the CDAD spectra in a straightforward manner, independent of the photoionization dynamics. We believe this characteristic should enhance the practicality of this technique. CDAD has recently been observed experimentally. Here, we only give the highlights of this new method; the details will be given in a later publication. Keywords: Reprints. (JHD)

DESCRIPTORS: (U) *POLYATOMIC MOLECULES,
PHOTODISSOCIATION, FLUORESCENCE.

AD-A198 278

AD-A198 278

UNCLASSIFIED

PAGE 212

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 277 7/5

AD-A198 276 20/4 12/2

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB
OF CHEMICAL PHYSICS

SIBLEY SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING
ITHACA NY

(U) Atomic and Molecular Alignment from Photoelectron
Angular Distributions in $(n+1)$ Resonantly Enhanced
Multiphoton Ionization.

(U) An Examination of Forcing in Direct Numerical
Simulations of Turbulence.

JAN 88 9P

88 23P

PERSONAL AUTHORS: Dubs, Richard L.; McKoy, V.; Dixit, S.
N.

PERSONAL AUTHORS: Eswaran, V.; Pope, S. B.

CONTRACT NO. AFDSR-87-0036, DE-FG03-87ER60513

CONTRACT NO. AFOSR-85-0083

PROJECT NO. 2303

PROJECT NO. 2308

TASK NO. 63

TASK NO. A2

MONITOR: AFOSR
TR-88-0925MONITOR: AFOSR
TR-88-0800

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v88
n2 p988-974, 15 Jan 88.

SUPPLEMENTARY NOTE: Pub. in Computers & Fluids, v16 n3
p257-278 1988.

ABSTRACT: (U) Two distinct $(n + 1)$ REMPI techniques for
obtaining the alignment of gas phase atom molecules from
photoelectron angular distributions are presented. In
both methods, the alignment is extracted from the angular
distributions independently of the photoionization
dynamics. The first method, which takes advantage of
circular dichroism in the angular distributions (CDAD)
has already been established experimentally as a useful
probe of state alignment. The theory outlined in previous
work is expanded here. The second method involves
photoionization with light linearly polarized along the
photoelectron collection direction and is presented here
for the first time. Keywords: Reprints. (JHD)

ABSTRACT: (U) A spectral forcing scheme is developed to
provide the means to obtain statistically stationary
velocity fields in direct numerical simulations of
homogeneous, isotropic turbulence. Tests of the forcing
scheme show that the details of the forcing do not have a
significant effect on the small-scale structure of the
velocity fields. Forced turbulent simulations are used to
determine the effects of the time-step, and the spatial
resolution of the grid, on the computations. Keywords:
Statistical distributions. (edc)

DESCRIPTORS: (U) *PHOTOIONIZATION, *PHOTOELECTRON
SPECTRA, ALIGNMENT, ANGLES, ATOMS, CIRCULAR, COLLECTION,
DICHROISM, DISTRIBUTION, DYNAMICS, MOLECULES,
PHOTOELECTRONS, REPRINTS, VAPOR PHASES.

DESCRIPTORS: (U) *TURBULENCE, COMPUTATIONS, GRIDS,
ISOTROPISM, NUMERICAL ANALYSIS, RESOLUTION, SIMULATION,
SPATIAL DISTRIBUTION, STATIONARY, STATISTICAL
DISTRIBUTIONS, VELOCITY.

IDENTIFIERS: (U) FORCING SCHEMES, PE61102F,
WUAFOSR2308A2.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A198 277

AD-A198 276

UNCLASSIFIED

PAGE 216

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 273 12/3

AD-A198 270 7/3 7/4

PRINCETON UNIV NJ

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) On Lifetimes Influenced by a Common Environment.

(U) The Electronic and Molecular Structure of Silyl Nitrene.

DESCRIPTIVE NOTE: Rept. for May 87-Apr 88.

APR 88 5P

87 23P

PERSONAL AUTHORS: Gordon, Mark S.

PERSONAL AUTHORS: Cinlar, Erhan; Shaked, Moshe; Shanthikumar, J. G.

CONTRACT NO. AFOSR-87-0049

CONTRACT NO. AFOSR-87-0050, \$AFOSR-84-0205

PROJECT NO. 2303

PROJECT NO. 2304

TASK NO. B3

TASK NO. A5

MONITOR: AFOSR

TR-88-0698

MONITOR: AFOSR
TR-88-0760

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Consider the lifetimes T sub 1, ..., T sub k of k components subjected to a randomly varying environment. They are dependent on each other because of their common dependence on the environment. The parameters of the model are the distribution of the random process which describes the environment and a set of rate functions which determine the probability law of T sub 1, ..., T sub k as a function of the distribution of the environment. We find conditions on the parameters of the model which imply that T sub 1, ..., T sub k are associated. Other conditions which imply that T sub 1, ..., T sub k have the multivariate aging properties IHR (increasing hazard rate) and NBU (new better than used) are also described. Also, two such models are compared. In particular, we characterize the parameters of these models so that stochastic ordering between the two vectors of resulting lifetimes can be obtained. (kr)

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *PARAMETRIC ANALYSIS, DISTRIBUTION, ENVIRONMENTS, HAZARDS, MULTIVARIATE ANALYSIS, PROBABILITY, RATES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5.

AD-A198 273

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v148 n1,2 p148-150, 29 Apr 88.

ABSTRACT: (U) FORS MC SCF calculations performed with the 6-31G(d) basis set have been used to predict the geometries of the lowest singlet (1E) and triplet (3A2) states of silyl nitrene. Both states are found to have C3v symmetry at this computational level. Single-point second-order configuration interaction calculations (that is, all single and double excitations from the FORS MC SCF reference configuration) at the MCF SCF geometries predict the triplet ground state to be 42.3 kcal/mol below 1E and only 8.2 kcal/mol above the singlet ground state of silanimine. Imines, Reprints. (mjn)

DESCRIPTORS: (U) *MOLECULAR STRUCTURE, *NITROGEN COMPOUNDS, *SILANES, COMPUTATIONS, CONFIGURATIONS, ELECTRONICS, GROUND STATE, IMINES, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2303B3, PE81102F, *Nitrene/silyl).

AD-A198 270

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 269 CONTINUED

AD-A198 269 20/1 9/4

MASSACHUSETTS INST OF TECH CAMBRIDGE CENTER FOR
MATERIALS SCIENCE AND ENGINEERING

(U) Lattice Vibrations in Thin-Film Carbon: Electron-
Rayleigh-Wave Interaction.

APR 88 9P

PERSONAL AUTHORS: Sugihara, Ko

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0711

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review B, v37 p7083-
7089, 15 Apr 88.

ABSTRACT: (U) Sound-wave propagation in thin-film carbon is investigated in the long-wavelength approximation. The Rayleigh wave, with a small damping constant and with polarization along the c axis, has a small sound velocity $v_{\text{sub } r}$ is about 10000 cm/sec if C sub 44 is small. Since the Rayleigh-wave phonons interacting with carriers have small energies ($\hbar\omega \approx 1$ K) sub B is somewhat < 1 K), these phonons are highly excited even at helium temperature and they scatter carriers. Of particular interest for transport properties is the carrier relaxation time $\tau_{\text{sub } r}$ is about 10 to the -12th power sec for film thickness d somewhat < 100 A at T somewhat < 1 K. If the sample is assumed to be composed of an aggregate of many thin films, and each film weakly couples elastically with the others, the present theory is applicable to a sample with bulk thickness. The electron-Rayleigh-wave interaction is responsible for the unusual temperature dependence of the resistivity observed for a polyacrylonitrile-based fiber heat-treated to about 1300 C. A comment is given about one possible mechanism for the anomalous linear temperature dependent specific heat observed in some kinds of carbons and in polycrystalline graphite. Keywords: Sound wave, Rayleigh wave, Elastic constants, Carbon film, Resistivity.

AD-A198 269

AD-A198 269

UNCLASSIFIED

PAGE 218

EVJ00F

DESCRIPTORS: (U) *CARBON, *SURFACE ACOUSTIC WAVES, *RAYLEIGH WAVES, *LATTICE DYNAMICS, *THIN FILMS, ACOUSTIC VELOCITY, CONSTANTS, DAMPING, ELASTIC PROPERTIES, GRAPHITE, HELIUM, LONG WAVELENGTHS, PHONONS, POLARIZATION, POLYCRYSTALLINE, RELAXATION TIME, REPRINTS, RESISTANCE, SOUND WAVES, TEMPERATURE, THERMAL PROPERTIES, THICKNESS, TRANSPORT PROPERTIES.

Reprints. (jhd)

IDENTIFIERS: (U) WUAFOSR2303A3, PE81102F.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 247 20/3

AD-A198 247 CONTINUED

DAYTON UNIV OH RESEARCH INST

(U) Laser Measurements of Transient High-Strength Electric Fields.

DESCRIPTIVE NOTE: Final rept. 1 Oct 85-30 Dec 87.

JUL 87 35P

PERSONAL AUTHORS: Becker, Roger J.

REPORT NO. UDR-TR-88-75

CONTRACT NO. AFOSR-84-0232

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-88-0753

UNCLASSIFIED REPORT

ABSTRACT: (U) An experiment was undertaken to determine the usefulness of Rayleigh and Raman scattering as a nonintrusive probe for measuring local electric field strengths. Measurements were made using an argon-ion laser, photon counting electronics, and a 30 kV Stark cell capable of pressurization to 1 MPa. This system was successfully used with He, Ne, Ar, Kr, N₂, CO₂, CF₄, SF₆, and CC1₂F₂ gases using a right-angle scattering configuration in which the observation direction was along the axis of polarization of the laser beam. In all cases, a drop was seen in the counting rate for Rayleigh scattering. A means of calculating the observed effect in Rayleigh scattering was selected based on quantum perturbation theory. This method used both a Coulomb approximation and a single-electron approximation. A computer code was written to implement the perturbation scheme. This code requires input in the form of matrix elements taken from tables in the literature. As not all of the needed entries are available in published form, a second program was being written to extend the published tables. The computer calculations were made to give all contributions to the polarizability including those involving more than one continuum state. Raman spectra were unchanged by 10 MV/m applied fields. (RH)

AD-A198 247

AD-A198 247

UNCLASSIFIED

PAGE 212

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 228 12/1

AD-A198 227 12/1

TEXAS A AND M UNIV COLLEGE STATION

TEXAS A AND M UNIV COLLEGE STATION

(U) Variance Function Estimation in Regression: The Effect of Estimating the Mean.

(U) A Quick and Easy Multiple Use Calibration Curve Procedure.

DESCRIPTIVE NOTE: Technical rept. no. 4, Aug 87-Aug 88,

DESCRIPTIVE NOTE: Technical rept. no. 11, Aug 87-Aug 88,

AUG 88 18P

AUG 88 21P

PERSONAL AUTHORS: Hall, Peter; Carroll, R. J.

PERSONAL AUTHORS: Carroll, R. J.; Sacks, J.; Spiegelman, C. H.

CONTRACT NO. F49620-85-C-0144

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A6

TASK NO. A6

MONITOR: AFOSR TR-88-0842

MONITOR: AFOSR TR-88-0843

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Australian National University, Canberra, Dept. of Statistics.

SUPPLEMENTARY NOTE: Prepared in cooperation with North Carolina Univ. at Chapel Hill, Illinois Univ., Urbana and National Bureau of Standards.

ABSTRACT: (U) The authors consider estimation of a variance function g in regression problems. Such estimation requires simultaneous estimation of the mean function f . We obtain sharp results on the extent to which the smoothness of f influences best rates of convergence for estimation g . For example, in nonparametric regression with two derivatives on g , classical rates of convergence are possible if and only if the unknown f satisfies a Lipschitz condition of order $1/3$ or more. If a parametric model is known for g , then g may be estimated $n^{1/2}$ - consistently if and only if f is Lipschitz of order $1/2$ or more. Optimal rates of convergence are attained by kernel estimators. (kr)

DESCRIPTORS: (U) *ESTIMATES, *MEAN, *REGRESSION ANALYSIS, *VARIATIONS, CONVERGENCE, MATHEMATICAL MODELS, NONPARAMETRIC STATISTICS, OPTIMIZATION, PARAMETRIC ANALYSIS, RATES.

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A8

ABSTRACT: (U) The standard multiple use calibration procedure due to Scheffe (1973) states that with probability 1-delta, the proportion of calculated confidence intervals containing the true unknowns is at least 1-alpha in the long run. The probability 1-delta refers to the probability that the calibration experiment results in a 'good' outcome. In Scheffe's formulation a good outcome involves both coverage of the true underlying regression curve and an upper confidence limit for sigma, the scale parameter. Scheffe's procedure is fairly difficult for practitioners to apply because it relies on tables that are not easy to use. A simpler notion of 'goodness' which only requires the calibration experiment to result in coverage of the underlying regression leads to easily calculated confidence intervals for the unknowns. In addition, these intervals are generally shorter than Scheffe's. An application example is given to illustrate the technique. Keywords: Scheffe uncertainty bounds, Confidence intervals, Nonparametric calibration, Calibration curves. (mjm)

AD-A198 228

AD-A198 227

UNCLASSIFIED

PAGE 220

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 227 CONTINUED

AD-A198 225 7/4

DESCRIPTORS: (U) *CALIBRATION, *CONFIDENCE LEVEL,
*CONFIDENCE LIMITS, *REGRESSION ANALYSIS, GRAPHS,
INTERVALS, PARAMETERS, SCALE.

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Aspects of the Chemistry of Water in Ambient-
Temperature Chloroaluminate Ionic Liquids: 170 NMR
Studies.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A8.

DESCRIPTIVE NOTE: Rept. for 1 Dec 88-31 Mar 87,

87 4P

PERSONAL AUTHORS: Zawodzinski, Thomas A., Jr.;
Osteryoung, R. A.

CONTRACT NO. AFOSR-87-0088

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0885

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v28 n17
p2920-2922 1987.

ABSTRACT: (U) Room-temperature ionic composed of
mixtures of chloroaluminate and organic chloride salts,
RCL(R = N-(1-butyl)pyridinium cation (Bupyr+) or 1-ethyl-3-
methylimidazolium cation (Im+)), have been used as
solvents for a wide variety of chemical studies. These
molten salts have several desirable properties. The
primary source of protonic impurities in the room-
temperature chloroaluminate melts is water with the
organic chloride component of the melts. The latter salts
are extremely hygroscopic, and it has proven extremely
difficult to remove water completely. Associated with the
protonic impurities in the melts is oxide from water and
additionally from impurities in AlCl₃. A study of the
reduction of protons on a Pt electrode in melts has been
reported. The limiting currents for proton reduction
increased in a roughly linear fashion with the
concentration of water added to basic melts. Less current
was observed for an equivalent amount of water added to
an acidic melt. Finally, the addition of water to nearly
neutral melts apparently results in a release of 2
protons per water molecule. As part of an ongoing effort

AD-A198 227

AD-A198 225

UNCLASSIFIED

PAGE 221

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 225 CONTINUED

AD-A198 222 7/3

to study the chemistry of water in the room-temperature chloroaluminate melts, we have used oxygen 17 NMR spectra of water added to the melt to obtain information on the speciation of oxide and protons. Reprints. (aw)

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Reductive Amination of Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9))undecane-8,11-dione.

DESCRIPTORS: (U) *ALUMINATES, *CHLORINE COMPOUNDS, *FUSED SALTS, *WATER ANALYSIS, ACIDS, ADDITION, CHLORIDES, CURRENTS, IMPURITIES, LIMITATIONS, MELTS, MOLECULES, NEUTRAL, PROTONS, REDUCTION, REPRINTS, ROOM TEMPERATURE, SOLVENTS, SPECTRA, OXIDES, NUCLEAR MAGNETIC RESONANCE, SPECTROSCOPY.

88

PERSONAL AUTHORS: Marchand, Alan P.; Dave, Paritosh R.; Satyanarayana, N.; Arney, Betty E., Jr

CONTRACT NO. AFOSR-84-0085, DAAA21-86-C-0081

IDENTIFIERS: (U) Chloroaluminates, PE81102F, WUAFDSR2303B2

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-88-0914

UNCLASSIFIED REPORT

ABSTRACT: (U) Sodium cyanoborohydride is a highly selective reducing agent which is stable to pH 3 in aqueous acidic solution. Its ability to preferentially reduce iminium ions in the presence of ketone or aldehyde carbonyl groups renders it suitable for use as a reagent in the reductive amination of aldehydes and ketones. As part of an ongoing program that is concerned with the synthesis and chemistry of new, substituted pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9))undecanes, we have investigated the reductive amination of the title compound by using sodium cyanoborohydride in the presence of ammonium bromide. In our hands, the reaction with sodium cyanoborohydride in the presence of ammonium bromide at pH 7.5-8.0 afforded a mixture of three products. One product, could be isolated in pure form via careful fractional crystallization of the product mixture (see Experimental Section). However, the remaining mixture of cage diamine and cage diol proved to be intractable. Reprints. (mjm)

DESCRIPTORS: (U) *SODIUM BOROHYDRIDES, *CYANOGEN, ACIDS, AMMONIUM COMPOUNDS, BROMIDES, CHEMICAL AGENTS, CHEMISTRY, HANDS, IONS, KETONES, MIXTURES, REPRINTS, SOLUTIONS(MIXTURES), SYNTHESIS(CHEMISTRY), WATER.

IDENTIFIERS: (U) PE81102F, WUAFDSR2303B2, *Borohydride/sodium cyano.

AD-A198 225

AD-A198 222

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 220 7/3 7/4

AD-A198 220 CONTINUED

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

SPECTROSCOPY, SPINNING(MOTION), SURFACES.

(U) Use of Electron Spin Resonance Spectroscopy to Study
the Photochemistry of Adsorbed Dibenzy Ketone on
Porous Silica.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303B2, *Ketone/
dibenzyl).

88 8P

PERSONAL AUTHORS: Turro, Nicholas J.; Waterman, Kenneth C.
; Welsh, Kevin M.; Paczkowski, Mark A.; Zimmt, Matthew B.

CONTRACT NO. AFOSR-88-00043, \$PHS-CA-07957

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0820

UNCLASSIFIED REPORT

ABSTRACT: (U) With electron spin resonance (ESR) spectroscopy, it was possible to observe benzyl radical formed photochemically in situ from dibenzyl ketone (DBK) adsorbed on porous silica sample. The spectra showed different shapes and g values as a function of surface coverage and silpore diameters. With large pores (95A), spectral broadening at low coverages suggests into radical interactions, which become more profound with intermediate pore sizes (40A) due to the smaller interradsical distances. With still smaller pore sizes (20A), benzyl radicals immobile and relatively unreactive. In each case, the presence of water vapor leads to the same solution-like spectrum. The g values indicate that substantial crystal field distort occur on binding, which allows spin-orbit coupling due to mixing of the partially filled molecular orbital and unfilled orbitals. Two binding orientations are indicated, characterized by different g values. Keywords: Spectroscopy, Dibenzy ketone, Porous silica, Photochemistry, Spin orbit coupling, Reprint. (mjm)

DESCRIPTORS: (U) *BENZYL RADICALS, *ELECTRON SPECTROSCOPY, *ELECTRON SPIN RESONANCE, *POROUS MATERIALS, *SILICON DIOXIDE, *KETONES, ADSORPTION, COUPLING(INTERACTION), CRYSTALS, INTERACTIONS, ORBITS, ORIENTATION(DIRECTION), PHOTOCHEMICAL REACTIONS, REPRINTS,

AD-A198 220

AD-A198 220

UNCLASSIFIED

PAGE 225

EVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 218 7/4 20/12

AD-A198 218 CONTINUED

CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND
BIOCHEMISTRY

SUBSTRATES, VAPORS, POLYMERIC FILMS, HOLES(ELECTRON
DEFICIENCIES), VAPOR PRESSURE.

(U) Absorption of Gaseous Iodine by Polythiophene Films
and Powders,

IDENTIFIERS: (U) *Polythiophene, PE51102F, WUAFO5R2303A3

86 8P

PERSONAL AUTHORS: Reiss, W.; Kim, Dai-uk

CONTRACT NO. F49620-88-C-0060, NSF-CHE82-07432

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
YR-88-0824

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry,
v90 n9 p1973-1977 1986.

ABSTRACT: (U) Further determinations of the reversible
absorption isotherms of iodine (vapor) in both
polythiophene films and powders are performed. The films
exhibit isotherms of iodine uptake vs. iodine pressure
which, at low pressures, are concave downward at low
temperatures and concave upward at higher temperatures.
This behavior is interpreted in terms of hole-electron
equilibria. At a pressure of about 0.68 torr all film
isotherms exhibit a discontinuous slope to saturation.
The powder isotherms followed those for the film up to
the discontinuity, do not exhibit the discontinuity, and
continue to absorb iodine as the pressure is increased.
By mixing helium into the iodine vapor, we demonstrate
that the discontinuity occurs when the total gas pressure
is in the neighborhood of 0.68 torr. The phenomenon is
explained in terms of a electrochemical instability
caused by the formation of a Schottky diode at the film-
substrate interface. Reprints. (aw)

DESCRIPTORS: (U) *ABSORPTION, *IODINE, *ISOTHERMS,
*POLYMERS, *THIOPHENES, DIODES, ELECTROCHEMISTRY, HELIUM,
HIGH TEMPERATURE, INTERFACES, LOW PRESSURE, LOW
TEMPERATURE, MIXING, POWDERS, REPRINTS, REVERSIBLE,
SATURATION, SCHOTTKY BARRIER DEVICES, SLOPE, STABILITY,

AD-A198 218

AD-A198 218

UNCLASSIFIED

PAGE 224

EVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 211 7/4

AD-A198 189 6/4 6/1

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

HAHNEMANN UNIV SCHOOL OF MEDICINE PHILADELPHIA PA

(U) Memory-Induced Extra Resonances of Adsorbates,

APR 88 4P

PERSONAL AUTHORS: Arnoldus, Henk F.; George, Thomas F.

CONTRACT NO. F49620-88-C-0009

PROJECT NO. 2303

TASK NO. 83

MONITOR: AFOSR
TR-88-0828

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review Letters, v60
n15 p1487-1489, 11 Apr 88.

ABSTRACT: (U) The optical absorption profile of an atom-surface vibrational bond is studied. From Markovian relaxation theory it follows that the line shape is a Lorentzian around the adsorbate resonance frequency ω_0 . Dispersion relations for crystals have a fairly small cutoff frequency ω_c , which prohibits the use of such a simple theory. We calculated the spectral profile with finite memory-time reservoir theory, and we found that the modified Lorentzian vanishes above ω_0 . Also a new spectral line at $\omega_0 + \omega_c$ is predicted, which disappears in the Markovian limit. The physical origin of the new line is explained. Adsorbates, Extra resonances, Memory induced, Optical absorption profile, Markovian limit, Modified Lorentzian, Reprints. (MJM).

DESCRIPTORS: (U) *ABSORPTION, *ADSORBATES, *MARKOV PROCESSES, *RESONANCE, ATOMS, BONDING, CRYSTALS, DISPERSION RELATIONS, LIMITATIONS, LINE SPECTRA, OPTICAL PROPERTIES, PROFILES, RELAXATION, REPRINTS, SHAPE, SPECTRA, SPECTRAL LINES, SURFACES, THEORY, VIBRATION.

IDENTIFIERS: (U) PE61102F, NUAFO8R2303B3.

AD-A198 211

UNCLASSIFIED

AD-A198 189

PAGE 225

FVJ00F

(U) Electrophysiological Actions of Norepinephrine in Rat Lateral Hypothalamus. I. Norepinephrine Induced Modulation of LH Neuronal Responsiveness to Afferent Synaptic Inputs and Putative Neurotransmitters.

DESCRIPTIVE NOTE: Rept. for 1 Feb 87-3 Mar 88.

88 15P

PERSONAL AUTHORS: Sessler, Francis M.; Cheng, Jung-Tung; Waterhouse, Barry D.

CONTRACT NO. AFOSR-87-0138

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-0912

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Brain Research, v446 p77-89
1988.

ABSTRACT: (U) The present studies were conducted as part of an ongoing investigation of the effects of norepinephrine (NE) in neuronal circuits of the mammalian brain. In this report, we describe noradrenergic actions in the lateral hypothalamus (LH), an area which has been implicated in the central integration of cardiovascular regulatory mechanisms, fluid balance and ingestive behaviors. Microiontophoretically applied NE was interacted with extracellularly recorded responses of LH neurons to iontophoretically applied putative neurotransmitters - aminobutyric acid (GABA), acetylcholine (ACh) and glutamate (Glu); and activation of known input pathways from the reticular thalamus (RT) and the lateral preoptic area (LPO). Peri-event histograms of cell responses were computed before, during and after NE microiontophoresis and used to quantitatively evaluate monoamine-induced effects on spontaneous and stimulus evoked activity of LH neurons. The findings indicate that, as in other noradrenergic target regions of the CNS, NE can facilitate synaptically

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 189 CONTINUED

mediated responses of LH neurons. Taken together these observations suggest that NE may play an important regulatory role in the synaptic transfer of information within LH circuits, and consequently exert considerable influence over the influence over the homeostatic functions mediated by this structure. Keywords: Cerebral cortex, Cerebellum hypothalamus. (kt)

DESCRIPTORS: (U) *NERVE TRANSMISSION, *LEVARTERENOL, *NERVE CELLS, ACETYLCHOLINE, BRAIN, PHYSIOLOGICAL EFFECTS, BUTYRIC ACIDS, CEREBELLUM, CEREBRAL CORTEX, GLUTAMIC ACID, HOMEOSTASIS, MAMMALS, MODULATION, NEUROMUSCULAR TRANSMISSION, RESPONSE(BIOLOGY), RETICULAR FORMATION, SALTS, SYNAPSE, THALAMUS, TRANSFER.

IDENTIFIERS: (U) WUAFOSR2312A2, PE81102F, *Norepinephrine.

AD-A198 188

12/3

RANDOM APPLICATIONS INC MONTROSE CO

(U) Level Crossings of Filtered Dichotomous Noise.

DESCRIPTIVE NOTE: Rept. for Aug 87-Mar 88.

MAR 88 8P

PERSONAL AUTHORS: Pawula, R. F.

CONTRACT NO. F49620-85-C-0093

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0794

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v137 n5 p1731-1735, 1 Mar 88.

ABSTRACT: (U) The reprint shows that the level crossing rate of a process $y(t)$ which results from nonlinear filtering of non-Markov dichotomous noise $x(t)$ can be expressed as $N \text{ sub } 1 = \beta \alpha(1 - F\text{-Sq}(1)) p(1)$, where $p(y)$ is the density of $y(t)$, β is an inverse time parameter, and $F \text{ sub } L$ is a nonlinearity in the system equation $\dot{y} + \beta F(y) = \beta x$. Four examples are given in which Monte Carlo methods are used to establish the veracity of the theoretical results. In a fifth example, the theoretical result is obtained by time averaging. The new result is compared with the crossing rate for Gaussian processes and it is found that $N \text{ sub } 1$ approx. $B(1)p(1)$ in each case, where $B(y)$ is the second conditional moment in the extended Fokker-Planck equation for $p(y)$. Keywords: Dichotomous noise; Level crossings; Extended Fokker Planck equation; Monte Carlo method. (Jhd)

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *STATISTICAL PROCESSES, *MATHEMATICAL FILTERS, CROSSINGS, FOKKER PLANCK EQUATIONS, INVERSION, MEAN, MONTE CARLO METHOD, PARAMETERS, RATES, REPRESENTS, TIME.

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F, *Nonlinear filtering, Level crossing rate, Dichotomous noise.

AD-A198 189

AD-A198 188

UNCLASSIFIED

PAGE 226

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 188 CONTINUED
Gaussian processes.

AD-A198 155 20/8

ILLINOIS UNIV AT URBANA DEPT OF NUCLEAR ENGINEERING

(U) Opening Switch Research on a Plasma Focus VI.

DESCRIPTIVE NOTE: Final rept. 30 Sep 86-29 Sep 87.

FEB 88 140P

PERSONAL AUTHORS: Gardin, Glenn A.

CONTRACT NO. AFOSR-88-0303

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-88-0830

UNCLASSIFIED REPORT

ABSTRACT: (U) The utility of the plasma focus as an opening switch was analyzed on the basis of our previous experimental observations and those on other Mather-type devices. A load resistor has recently been included in the opening switch circuit model and the analysis indicates that the typical pinch resistances measured (approx .1ohm) are too small to drive typical load resistances encountered in pulsed power (approx 1ohm) in terms of % energy transferred (<2%) and the time required for the transfer (> or = 200ns). A scaling law for pinch stability has been derived, which is consistent with our data and that from several other experimental devices; this model predicts that a plasma focus could be designed to permit longer energy transfer times by increasing the anode radius. Keywords: Dense plasma focus, Soft x-ray spectroscopy, Laser interferometry, Opening switch research, Soft xrays. (MUM).

DESCRIPTORS: (U) *INTERFEROMETRY, *LASERS, *PLASMAS(PHYSICS), *SPECTROSCOPY, *X RAYS, ANODES, CIRCUITS, DENSITY, DRIVES, ENERGY TRANSFER, FOCUSING, MODELS, OPENING(PROCESS), PINCH EFFECT, POWER, PULSES, RADIUS(MEASURE), RESISTANCE, RESISTORS, SCALING FACTORS, STABILITY, SWITCHES.

IDENTIFIERS: (U) WUAFOSR2301A7, PE81102F.

AD-A198 188

AD-A198 155

UNCLASSIFIED

PAGE 227

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 154 CONTINUED

AD-A198 154 14/2 8/7

TEXAS UNIV HEALTH SCIENCE CENTER AT SAN ANTONIO DEPT OF RADIOLOGY

(U) Center for Basic Research in Radiation Bioeffects.

DESCRIPTIVE NOTE: Final rept. 1 Oct 87-31 Mar 88.

JUN 88 36P

PERSONAL AUTHORS: Maltz, Martin L.

CONTRACT NO. AFOSR-87-0028

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR
TR-88-0831

UNCLASSIFIED REPORT

ABSTRACT: (U) The opportunity for university located biomedical research scientists to investigate the health hazards associated with radiofrequency radiation (RFR) exposure has been limited by the absence of the necessary exposure facilities at their institutions, in close proximity to the laboratories where biological systems are maintained. To eliminate this difficulty, and as a means of encouraging greater participation by physicians and biomedical researchers in answering the numerous questions which have been, are being, or will be raised as to possible adverse health effects of non-ionizing RFR, a unique facility has been designed and constructed in the Department of Radiology at the University of Texas Health Science Center at San Antonio (UTHSCSA); it is the Center for Basic Research in Radiation Bioeffects (CBRRB). The funding for the construction and equipping of the CBRRB came from two sources; one was the Department of Defense (U.S. Air Force) University Research Instrumentation Program (\$299,849.00) (AFOSR-87-0028), and the second was the Permanent University Fund (PUF) of the University of Texas (\$173,000.00). The complete facility, jointly funded by the DOD and the PUF funds, is additionally unique in that it will allow for biological experimentation involving simultaneous RFR and X-ray (ionizing radiation) exposures, or RFR and ultraviolet light (UV) exposures. All exposures would be performed in

AD-A198 154

AD-A198 154

the specially designed anechoic chamber, which is both temperature and humidity controlled. Keywords: Laboratories, Microwaves, Radiofrequency radiation, X-rays, Ionizing radiation, Anechoic chamber, Ultraviolet light, Radiation biology. (kt)

DESCRIPTORS: (U) *LABORATORIES, ADVERSE CONDITIONS, AIR FORCE, ANECHOIC CHAMBERS, BIOLOGY, BIOMEDICINE, DEPARTMENT OF DEFENSE, EXPOSURE(GENERAL), FACILITIES, HAZARDS, HEALTH, HUMIDITY, INSTRUMENTATION, IONIZING RADIATION, MEDICAL RESEARCH, MICROWAVES, PHYSICIANS, RADIATION, RADIOBIOLOGY, RADIOFREQUENCY, RADIOLOGY, SCIENTISTS, TEXAS, ULTRAVIOLET RADIATION, UNIVERSITIES, LABORATORY EQUIPMENT.

IDENTIFIERS: (U) PE61NOZF, WJAFOSR2917A4.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 153

7/2

9/1

AD-A198 147

14/2

STANFORD UNIV CA DEPT OF MATERIALS SCIENCE AND
ENGINEERING

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF PHYSICS

(U) Crystal Growth and Mechanical Properties of
Semiconductor Alloys.

(U) Structure Dynamics of Excited Atoms.

DESCRIPTIVE NOTE: Annual rept. 15 Apr 87-14 Apr 88,
88.DESCRIPTIVE NOTE: Final technical rept. 1 Oct 86-30 Sep
88.

APR 88

25P

MAR 88

3P

PERSONAL AUTHORS: Stevenson, D. A.

PERSONAL AUTHORS: Gallagher, Y. F.

CONTRACT NO. AFOSR-85-0158

CONTRACT NO. AFOSR-87-0005

PROJECT NO. 2308

PROJECT NO. 2301

TASK NO. B1

TASK NO. A4

MONITOR: AFOSR

MONITOR: AFOSR

TR-88-0832

TR-88-0848

UNCLASSIFIED REPORT

ABSTRACT: (U) The mechanical properties of semiconductor materials is a topic of practical and theoretical interest. The mechanical properties relate to the changes in electronic and optical properties that may accompany the processing of semiconductor materials into devices, particularly the introduction of dislocations upon thermal processing, slicing, polishing, ion implantation, and the application of films. (mjm)

DESCRIPTORS: (U) *ALLOYS, *CRYSTAL GROWTH, *SEMICONDUCTORS, DISLOCATIONS, ELECTRONICS, FILMS, HEAT, ION IMPLANTATION, MATERIALS, MECHANICAL PROPERTIES, OPTICAL PROPERTIES, PROCESSING.

IDENTIFIERS: (U) WUAFOSR2308B1, PE61102F.

UNCLASSIFIED REPORT

ABSTRACT: (U) The instrumentation grant was used to acquire three types of equipment. First we have purchased a high repetition rate Lambda-Physik eximer laser which we are using to pump several dye lasers. The eximer laser is particularly attractive as a pump laser for blue dye lasers. The eximer laser has been in constant use since June 1987, and we are now trying to improve our dye lasers to allow them to run at the 100 Hz repetition rate of the eximer laser. The second major category of equipment we have purchased is radio frequency and microwave equipment. We have acquired a new Hewlett Packard (HP) sweep oscillator to replace our existing oscillator which is now 15 years old. Specifically we have purchased an HP 8350 mainframe and plug-in units to cover the ranges 2-8, 8-18, and 18-25 GHz. These are entirely solid state devices which can, if need be, be phase locked to an external crystal controlled counter. The third kind of equipment is signal acquisition and averaging equipment. Specifically we have bought a fast 350 MHz Tektronix oscilloscope for diagnosing fast signals, especially photoelectron signals, and a 150 MHz digitizing, averaging oscilloscope which enables us to record time resolved data in a particularly efficient fashion. One can record the entire time resolved signal after each laser shot, raising the effective data collection efficiency by a factor of fifty

AD-A198 153

AD-A198 147

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 147 CONTINUED

AD-A198 143 22/5 22/2 14/2

relative to using a boxcar averager as we now do. (JHD)

GENERAL ANALYTIC CORP ATHENS GA

DESCRIPTORS: (U) *LASERS, *OSCILLATORS, ELECTRONIC EQUIPMENT.

(U) A New Approach to the Analysis and Control of Large Space Structures. Phase 1.

IDENTIFIERS: (U) WJAFOSR2301A4, PEB1102F.

DESCRIPTIVE NOTE: Final rept. 15 Oct 87-14 Mar 88.

MAR 88 129P

PERSONAL AUTHORS: Adomian, George

REPORT NO. GAC-881

CONTRACT NO. F49620-87-C-0098

PROJECT NO. K822

TASK NO. F1

MONITOR: AFOSR
TR-88-0702

UNCLASSIFIED REPORT

ABSTRACT: (U) The large structures contemplated would be constructed in space. Because of the limitations on launching massive payloads, it is clear that these structures will be made of lightweight material and will necessarily be flexible and easily excited into vibrations. Analytical problems will arise in designing large space structures in which physically realistic and accurate solutions will be critical. Such designs must consider weight, sizes, stiffness, thermal and mechanical distortions, stresses due to gravity and positioning thrusts. Some specific analytical problems will involve vibration, heating and cooling, multidimensional control, and structural problems arising from random support motion and random fluctuations of the system dynamic properties. Keywords: Decomposition method, Distributed control, Heating, Space stations, Matrix Riccati equation, Nonlinear stochastic control, Partial differential equations, Vibration, Spacecraft. (jes)

DESCRIPTORS: (U) *COOLING, *SPACE STATIONS, *SPACECRAFT, CONTROL, DECOMPOSITION, DISTORTION, DISTRIBUTION, DYNAMICS, GRAVITY, LAUNCHING, LIGHTWEIGHT, LIMITATIONS, MECHANICAL PROPERTIES, MOTION, NONLINEAR SYSTEMS, PARTIAL DIFFERENTIAL EQUATIONS, POSITION(LOCATION), RANDOM

AD-A198 147

AD-A198 143

UNCLASSIFIED

PAGE 220

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 143 CONTINUED

AD-A198 138 8/1

VARIABLES, STIFFNESS, STOCHASTIC CONTROL, STRESSES,
STRUCTURAL PROPERTIES, STRUCTURES, THERMAL PROPERTIES,
THRUST, VIBRATION, SPECTROSCOPY.

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Mechanism of Chain Extension Step in Biosynthesis,

IDENTIFIERS: (U) MUAFOSRK822F1.

88 10P

PERSONAL AUTHORS: Devar, Michael J.; Dieter, Kenneth M.

CONTRACT NO. AFOSR-88-0022

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0859

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Biochemistry, v27 p3302-3308
1988.

ABSTRACT: (U) The chain extension step in the enzymatic synthesis of fatty acid synthase, involving a formal Claisen condensation of thio esters, has been clarified by theoretical calculations for model systems, using the modified neglect of diatomic overlap and Austin Model 1 parametric self-consistent field molecular orbital procedures. The reaction involves a free carbanion, formed by decarboxylation of a malonate ion. Formation of the carbanion and condensation with the fatty acid thio ester are not concerted. The decarboxylation is strongly endothermic. It is brought about by electrostatic interaction (field effect) with an ammonium ion derived from an adjacent lysine residue, the ions being far enough apart to inhibit proton transfer between them. Proton transfer would lead to an enol that is predicted not be able to undergo the Claisen condensation. The formation of the ammonium ion is considered in terms of the pK sub a of the relevant groups. The bearing of this work on a recent interpretation of the activity and selectivity of enzyme reactions is discussed, and some misunderstandings concerning this interpretation are clarified. Reprints. (aw)

DESCRIPTORS: (U) *BIOSYNTHESIS, *FATTY ACIDS, *SYNTHASES, CONDENSATION REACTIONS, THIOLS, ESTERS, IONS, CARBORANYL RADICALS, REPRINTS.

AD-A198 143

AD-A198 138

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 138 CONTINUED

AD-A198 137 7/2 7/4

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

(U) Simultaneous EPR (Electron Paramagnetic Resonance) Electrochemical Measurements on Polyfluorene in Ambient Temperature Ionic Liquids.

88 8P

PERSONAL AUTHORS: Oudard, J. F.; Allendoerfer, R. D.; Osteryoung, R. A.

CONTRACT NO. AFOSR-87-0088

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0870

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Synthetic Metals, v22 p407-414 1988.

ABSTRACT: (U) Simultaneous electron paramagnetic resonance (EPR) and electrochemical measurements have been carried out in polyfluorene prepared by monomer oxidation and utilized in an ambient temperature ionic liquid consisting of 1-methyl-3-ethylimidazolium chloride-aluminum chloride. A considerable EPR signal is observed in both the reduced and oxidized states; the EPR signal achieves a maximum value coincident with the peak current during a cyclic voltammogram. Assuming that the process is two one-electron steps, initially forming a radical cation, the difference between the two E values is estimated as less than 70 mV. Keywords: Electroactive conducting polymers, Chloroaluminates, Electrochemistry. Reprints. (Jes)

DESCRIPTORS: (U) *CATIONS, *ELECTROCHEMISTRY, *ELECTRON PARAMAGNETIC RESONANCE, *SYNCHRONISM, ELECTRIC CURRENT, MEASUREMENT, MONOMERS, OXIDATION, PEAK POWER, POLYMERS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A198 138

AD-A198 137

UNCLASSIFIED

PAGE 232

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 134

7/4

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB
OF CHEMICAL PHYSICS

(U) (2+1) REMPI (Resonant-Enhanced Multiphoton Ionization)
of NO via D 2 Sigma(+) State: Rotational Branching
Ratios.

JUL 87

4P

PERSONAL AUTHORS: Rudolph, H.; Dixit, S. N.; McKoy, V.;
Huo, Winifred M.

CONTRACT NO. AFOSR-87-0039

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0923

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters,
V137 n8 p521-523, 3 JUL 87.

ABSTRACT: (U) Recent photoelectron spectroscopic studies
in a (2 + 1) REMPI of NO via the Rydberg D2 sigma(+) state
have revealed anomalous ionic rotational branching
ratios. We have performed ab initio calculations of these
branching ratios and find that the molecular nature of
the ionization continuum plays an essential role in the
dynamics. Even though the bound orbital is very atomic-
like (> 98% p-like), the photoelectron continuum
wavefunction is quite sensitive to the non-spherical
nature of the molecular ionic potential and causes a
strong persistence of the p-partial wave which, in turn,
leads to a large delta N = 0 peak. Keywords: Reprints.
(mjm)

DESCRIPTORS: (U) *DYNAMICS, *IONIZATION, *NITROGEN
OXIDES, PHOTOELECTRONS, REPRINTS, SENSITIVITY,
SPECTROSCOPY, WAVE FUNCTIONS.

AD-A198 134

AD-A198 130

22/1

BUSINESS AND TECHNOLOGICAL SYSTEMS INC LAUREL MD

(U) Algorithms for Robust Identification and Control of
Large Space Structures. Phase 1.

DESCRIPTIVE NOTE: Final rept. Aug 87-Mar 88.

MAY 88

85P

PERSONAL AUTHORS: Carroll, James V.

REPORT NO. BTS83-88-34/AB, J1131

CONTRACT NO. F49620-87-C-0099

PROJECT NO. K822

TASK NO. F1

MONITOR: AFOSR
TR-88-0755

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with SDIO/
Innovative Science and Technology Office, Washington, DC.

ABSTRACT: (U) A new method of providing robust attitude
control for tracking and slewing maneuvers for large
flexible space structures in orbit is developed, and
preliminary analyses and performance studies are
conducted. The key elements of the method are system
identification in real time, based on canonical variate
analysis, and adaptive robust control using Model
predictive control. The Canonical Variate Analysis method
also possesses the built-in capability for performing
statistically optimal model order reduction.
Computational algorithms are developed using several low
order flexible models. The results of this Phase I SBIR
feasibility effort demonstrate that the new method is
subject to careful design to reduce computer core size
problems, but that its overall performance offers
encouraging potential for more complete development.
Keywords: Mathematical models, Computations. (KR)

DESCRIPTORS: (U) *ALGORITHMS, *ATTITUDE CONTROL SYSTEMS,
*FLEXIBLE STRUCTURES, *MATHEMATICAL MODELS, *SPACECRAFT,
COMPUTATIONS, CORES, IDENTIFICATION, MANEUVERS.

AD-A198 130

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 130

CONTINUED

AD-A198 094

20/13

OPTIMIZATION, SELF CONTAINED, SIZES(DIMENSIONS), SLEWING,
TRACKING.

SYSTEMS RESEARCH LABS INC DAYTON OH

(U) Surface Thermometry of Energetic Materials by Laser-
Induced Fluorescence.

IDENTIFIERS: (U) PE632225, WJAFOSRK822F1.

DESCRIPTIVE NOTE: Annual technical rept. 17 Feb 87-17 Feb
88,

APR 88 36P

PERSONAL AUTHORS: Goss, Larry P.; Post, Michael E.

REPORT NO. SRL-5510

CONTRACT NO. F49620-87-C-0040

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFDSR
TR-88-0765

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates. All
DYIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) The laser-induced fluorescence from
Dysprosium:YAG has been employed for the measurement of
temperature on reacting and nonreacting surfaces. Point,
line, and two-dimensional mapping of the surface
temperature has been demonstrated utilizing the tripled
output (355 nm) of a Neodymium:YAG laser. The temporal
and spatial distribution of the temperature was recorded
with a two-dimensional intensified imaging system. The
technique has also been utilized for the measurement of
the thermal depth profile of a plastic material
undergoing rapid heating by a carbon dioxide laser. Work
is in progress on all three tasks of this program, with
the most significant accomplishment of the first year
being the demonstration of the two-dimensional thermal
imaging of heated inert surfaces. Thermal depth profiling
has been conducted with a linear array, while the
development of a fiber-optic thermal probe is in progress.
Preliminary efforts on bonding techniques of the Dy:YAG
crystals were initiated, with plasma spray holding the
most promise for nonmetallics. Future efforts on the

AD-A198 130

AD-A198 094

UNCLASSIFIED

PAGE 234

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 094 CONTINUED

project will be directed toward two-dimensional measurements on energetic materials, completion of thermal-probe development and applications, and identification of optimum bonding methods for nonmetallic materials. (AW)

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *SURFACE TEMPERATURE, NEODYMIUM LASERS, YAG LASERS, IMAGE PROCESSING, TEMPERATURE MEASURING INSTRUMENTS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A3.

AD-A198 093 5/8 20/8 6/4

NEW YORK UNIV N Y DEPT OF PSYCHOLOGY

(U) Higher Order Mechanisms of Color Vision.

DESCRIPTIVE NOTE: Annual progress rept. 15 Sep 86-14 Mar 88.

JUN 88

PERSONAL AUTHORS: Krauskopf, John

CONTRACT NO. AFOSR-86-0334

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-88-0740

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers activities since September 15, 1986. The main accomplishments have been: 1) a comprehensive study of the effects of chromatic content, blur and contrast of targets on vernier acuity and on stereo acuity; 2) the use of a new method of measuring chromatic discrimination under conditions of constant adaptation; and 3) continuation of the study of the chromatic properties of single cells in the monkey cortex. Keywords: Psychophysics, Color, Thresholds, Isoluminance, Charts. (KR)

DESCRIPTORS: (U) *VISUAL ACUITY, *COLOR VISION, *PSYCHOPHYSICS, ADAPTATION(PHYSIOLOGY), CHROMATICITY, DISCRIMINATION, MEASUREMENT, MONKEYS, CELLS(BIOLOGY), VISUAL PERCEPTION.

IDENTIFIERS: (U) PE81102F, WUAFOSR2313A5.

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 091 20/4

AD-A198 091 CONTINUED

ILLINOIS INST OF TECH CHICAGO FLUID DYNAMICS RESEARCH
CENTER

IDENTIFIERS: (U) PE61102F, WUAFOSR3484A1.

(U) Management and Control of Unsteady and Turbulent Flows.

DESCRIPTIVE NOTE: Annual technical rept. Oct 86-Oct 87,

JUN 88 15P

PERSONAL AUTHORS: Nagib, Nassan M.; Acharya, Mukund;
Corke, Thomas C.; Reissenthal, Patrick H.; Wark, Candace E.

CONTRACT NO. F49620-88-C-0133

PROJECT NO. 3484

TASK NO. A1

MONITOR: AFOSR
TR-88-0747

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress in four areas of research has been achieved during the first year. I. Controlled Transitioning Boundary Layers: phase coupled plane TS waves and oblique waves are used to study various types of transition including detuned modes. II. Turbulent Boundary Layer Structure and Control: the structures responsible for the turbulence production in high Reynolds number boundary layers have been documented and manipulated. III. Management of Unsteady and Three-dimensional Flows: flows over airfoils, axisymmetric forebodies, vortex-wing interactions, and wing-body junctions, are examined with and without passive and active flow manipulators including zero-mass base bleed. IV. Scanning Laser Anemometry: a technique capable of mapping the flowfield in a plane has been developed. Keywords: Unsteady flow, Separated flow, Flow control, Instrumentation. (aw)

DESCRIPTORS: (U) *BOUNDARY LAYER, *THREE DIMENSIONAL FLOW, *TURBULENT FLOW, *UNSTEADY FLOW, AIRFOILS, AXISYMMETRIC, BODIES, CONTROL, COUPLING(INTERACTION), FLOW, FLOW FIELDS, FLOW SEPARATION, FRONT ENDS AND SURFACES, JUNCTIONS, LASER ANEMOMETERS, MANIPULATORS, OPTICAL SCANNING, PASSIVE SYSTEMS, PRODUCTION, TURBULENCE, TURBULENT BOUNDARY LAYER, WAVES, WING BODY CONFIGURATIONS.

AD-A198 091

AD-A198 091

UNCLASSIFIED

PAGE 236

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY . SEARCH CONTROL NO. EVJ00F

AD-A198 084

14/2

20/4

AD-A198 084 CONTINUED

ILLINOIS INST OF TECH CHICAGO FLUID DYNAMICS RESEARCH
CENTER

FIELDS, STEADY FLOW.

(U) Equipment to Upgrade the Facilities of the IIT
(Illinois Institute of Technology) Fluid Dynamics
Research Center.

IDENTIFIERS: (U) PE81102F, WUAFOSR2817A1.

DESCRIPTIVE NOTE: Final technical rept.,

JUN 88

3P

PERSONAL AUTHORS: Way, John L.; Williams, David; Corke,
Thomas; Nagib, Hassan; Acharya, Mukund

CONTRACT NO. AFOSR-87-0038

MONITOR: AFOSR
TR-88-0742

UNCLASSIFIED REPORT

ABSTRACT: (U) We are currently approaching the completion of the National Diagnostic Facility at IIT. The facility is based on a computer-controlled wind tunnel with a test section 4 ft. high, 5 ft. wide and 36 ft. long exhibiting very high quality flow conditions under both constant and oscillating free-stream velocity conditions. The funding of this facility was initiated under a 1983 DOD University Research Instrumentation Program (AFOSR-Grant-83-0339). A key aspect of the wind tunnel design is the manner in which heat energy produced by fan inefficiencies, is removed from the recirculating tunnel air. This involves the first use of turning vanes which also act as heat transfer elements. The system is sized to allow continuous operation of the wind tunnel at speeds of 250 fps, which is 2.5 times those of common university wind tunnels, and two hours of operation at the maximum tunnel velocity of 550 fps. This new and unique facility will be dedicated to basic research at near-flight Reynolds numbers, thereby, aiding in the design of the next generation of aircraft. The equipment acquired under this Grant has made many of these objectives become realities. Keywords: Laser doppler anemometer, Data acquisition. (Ldc)

DESCRIPTORS: (U) *DIAGNOSTIC EQUIPMENT, *WIND TUNNELS, HEAT TRANSFER, LASER ANEMOMETERS, DOPPLER SYSTEMS, REYNOLDS NUMBER, COMPUTER APPLICATIONS, OSCILLATION, FLOW

AD-A198 084

AD-A198 084

UNCLASSIFIED

PAGE 237

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 077 11/8.1 20/11

AD-A198 077 CONTINUED

SOUTHWEST RESEARCH INST SAN ANTONIO TX

SIZES(DIMENSIONS), STRESS CONCENTRATION, SURFACES, TWO
DIMENSIONAL, WAKE.

(U) Advanced Modeling for Fatigue Growth of Small Surface
Cracks.

IDENTIFIERS: (U) PE8102F, WJAFOSR2302B2, LPN-SWRI-08-
1089.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Mar 88.

MAY 88 107P

PERSONAL AUTHORS: Gruse, T. A.; Raveendra, S. T.

CONTRACT NO. F49620-88-C-0048

PROJECT NO. 2302

TASK NO. 82

MONITOR: AFOSR
TR-88-0803

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary result of the sponsored research is the development and application of the boundary element method for two- and three-dimensional fatigue crack growth analysis. The two-dimensional formulation developed previously (AFOSR Contract No. F49620-84-C-0042) was extended to investigate the crack tip behavior of long and short cracks under cyclic loading. The influence of residual plasticity on stress intensity factor was used to obtain an unambiguous estimate of the plastic zone size. It was demonstrated that the effect of the plastic wake on the stress intensity factor for crack opening (closure) and the effect of the residual stress on the retardation are identical manifestations of the same plasticity process. The boundary integral equations also provide insight to the mathematical equivalence of these two effects. Keywords: Fracture mechanics, Fatigue crack growth, Crack retardation, Crack closure, Crack opening displacement, Boundary element method. (jes)

DESCRIPTORS: (U) *CRACK PROPAGATION, *CRACKS,
*FATIGUE(MECHANICS), BOUNDARIES, CLOSURES, CYCLES,
DISPLACEMENT, FATIGUE, FORMULATIONS, FRACTURE(MECHANICS),
GROWTH(GENERAL), INTEGRAL EQUATIONS, LOADS(FORCES),
MATHEMATICS, MODELS, OPENING(PROCESS), PLASTIC PROPERTIES,
PLASTICS, RESIDUAL STRESS, RESIDUALS, RETARDATION,

AD-A198 077

AD-A198 077

UNCLASSIFIED

PAGE 238

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 074 12/4

AD-A198 089 12/3

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) On Adaptive Control of Stochastic Bilinear Systems.

(U) Adaptive Policies for Discrete-Time Stochastic Control Systems with Unknown Disturbance Distribution,

DEC 87 5P

87 10P

PERSONAL AUTHORS: Cho, H.; Marcus, S. I.

PERSONAL AUTHORS: Hernandez-Lerma, Onesimo; Marcus, Steven I.

CONTRACT NO. F49820-88-C-0045

PROJECT NO. 2304

CONTRACT NO. F49820-88-C-0045, AFOSR-88-0029

TASK NO. A1

PROJECT NO. 2304

MONITOR: AFOSR TR-88-0894

MONITOR: AFOSR TR-88-0895

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, VAC-32 n12 p1103-1106 Dec 87.

SUPPLEMENTARY NOTE: Pub. in Systems and Control Letters, v9 p307-315 1987.

ABSTRACT: (U) The minimum variance control law for bilinear systems with known parameters is shown to yield in most cases controls with infinite variance; this calls into question the use of the so-called bilinear self-tuning regulators. An adaptive weighted minimum variance controller based upon the cost with weighted control efforts is suggested for first-order bilinear systems and is shown to yield boundedness of the closed-loop system variables under a certain condition on the parameter estimate. Keywords: Adaptive control; Bilinear systems; Minimum variance control; Reprints. (jhd)

ABSTRACT: (U) The authors introduce adaptive policies for discrete-time, infinite horizon, stochastic control systems with discounted reward criterion, where the disturbance process is a sequence of independent and identically distributed random elements with unknown distribution. These policies are shown to be asymptotically optimal and for each of them we obtain (almost surely) uniform approximations of the optimal reward function. Keywords: Reprints. (kr)

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *STOCHASTIC PROCESSES, CLOSED LOOP SYSTEMS, CONTROL, CONTROL THEORY, COSTS, ESTIMATES, PARAMETERS, REPRINTS, VARIABLES, ANALYSIS OF VARIANCE, WEIGHTING FUNCTIONS.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *STOCHASTIC CONTROL, ADAPTIVE SYSTEMS, APPROXIMATION(MATHEMATICS), DISCRETE DISTRIBUTION, DISTRIBUTION, HORIZON, POLICIES, REPRINTS, TIME.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1, Bilinear systems.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A198 068

11/4

RENSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL
ENGINEERING

(U) Analytical and Experimental Characterization of Damage
Processes in Composite Laminates.

DESCRIPTIVE NOTE: Final rept. 1 Sep 86-29 Feb 88,

JUN 88 128P

PERSONAL AUTHORS: Dvorak, George J.; Lays, Norman

REPORT NO. RPI-CECM-2

CONTRACT NO. AFOSR-84-0386

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-88-0707

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents a brief summary of the principal results obtained in a research program on damage development in fibrous composite laminates. The following technical subjects are described: (i) Effect of transverse cracks and fiber breaks on stiffness changes in unidirectional and laminated plates. (ii) Effect of ply thickness on initial failure and on progressive cracking in brittle matrix laminates, and (iii) Analysis of progressive cracking in metal and polymer composite laminates. Work in progress is discussed as well. Keywords: Composite materials, Cracking, Damage accumulation. (jes)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *LAMINATES, ACCUMULATION, CRACKS, DAMAGE, FIBERS, PLATES, POLYMERS, STIFFNESS, TRANSVERSE, UNIDIRECTIONAL.

IDENTIFIERS: (U) WUAFOSR230282, PB81102F.

AD-A198 068

UNCLASSIFIED

PAGE 240

EVJ00F

SEARCH CONTROL NO. EVJ00F

AD-A198 066

7/2

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Dynamics of Interaction between a 1,9-Biradical and Lanthanide Ions.

DESCRIPTIVE NOTE: Interim rept. 1986-1987,

88

4P

PERSONAL AUTHORS: Wang, Jinfeng; Welsh, Kevin M.; Waterman, Kenneth C.; Fahner, Paul; Doubleday, Charles, Jr

CONTRACT NO. AFOSR-88-0063, NSF-CHE84-21140

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0916

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v92 p3730-3732 1988.

ABSTRACT: (U) The lifetime of the triplet 1,9-biradical derived from 2,10-diphenylcyclododecanone was studied in the presence of lanthanide (III) ions (Ln3+) in methanol solvent. The biradical lifetime is greatly decreased in the presence of several of the Ln3+ ions. Bimolecular rate constants k_c for the Ln3+-induced biradical decay range from 0 to 2.8 x 10 to the 8th/M/S. The Ln3+ effect is not due to chemical reaction, since no new products are observed and the product ratio is minimally perturbed. It is proposed that k_c represents spin exchange between bi-radical and Ln3+. As a model for dipolar electronic relaxation by Ln3+, a possible alternative mechanism for Ln3+-induced biradical decay, proton T relaxation times for sodium dodecyl sulfate micelles were measured in the presence of Ln3+ was significantly different from the pattern of k_c vs. Ln3+. On the other hand, the known theory of spin exchange accounts qualitatively for the dependence of k_c on Ln3+. The evidence thus suggests spin exchange as the dominant mechanism. Keywords: Biradicals, Lanthanide ions, Spin exchange, Micelles, Magnetic effects. Reprints. (mjw)

AD-A198 066

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 088 CONTINUED

AD-A198 061 9/6 9/4 9/5

CALIFORNIA UNIV IRVINE DEPT OF ELECTRICAL ENGINEERING

DESCRIPTORS: (U) *COLLOIDS, *DODECANE, *IONS, *RARE
EARTH ELEMENTS, *SODIUM SULFATES, *LANTHANUM, CARBINOLS,
CHEMICAL REACTIONS, DIPOLES, DYNAMICS, ELECTRONS,
EXCHANGE, INTERACTIONS, MAGNETIC PROPERTIES, PROTONS,
RATIOS, RELAXATION, REPRINTS, SOLVENTS, SPINNING(MOTION).

(U) Integrated Acoustooptic Device Modules for Optical
Information Processing.

DESCRIPTIVE NOTE: Interim rept. no. 8, 1 Mar 87-28 Feb 88.

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F.

JUL 88 20P

PERSONAL AUTHORS: Tsai, Chen S.

CONTRACT NO. AFOSR-85-0378

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-88-0734

UNCLASSIFIED REPORT

ABSTRACT: (U) The objectives of this program year are focused on design, fabrication, and testing of wideband guided wave AO Bragg diffraction from surface acoustic waves in Gallium arsenide optical waveguides and conception/realization of multichannel integrated acousto-optics and electrooptics Bragg modulator modules in TIPE microlenses-based lithium niobates and GaAs channel-planar composite waveguides with applications to signal processing and computing. Wideband GaAs waveguide AO Bragg cells that operate in the acoustic frequency range from 300 to 1200 MHz have been realized. This represents realization of GHz GaAs waveguide AO Bragg cells shows that monolithically integrated optic signal processors such as radiofrequency spectrum analyzers may be fabricated in a common GaAs chip. Multichannel single-mode electrooptic cutoff modulator arrays and Bragg diffraction modulator arrays have been successfully realized in GaAs. One of the vital and remaining components toward monolithic (total) integration in GaAs is the waveguide microlens and linear lens array. Fabrication of negative index-change planar waveguide microlenses in both LiNbO3 and GaAs using ion milling. The waveguide lenses that have been fabricated and tested include single lenses and lens arrays of analog Fresnel, chirp grating, and hybrid analog Fresnel chirp grating types. We have obtained near diffraction-limited spot

AD-A198 061

AD-A198 068

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 061 CONTINUED

AD-A198 042 12/3

sizes and good efficiencies in such preliminary components. (JHD)

TEXAS A AND M UNIV COLLEGE STATION DEPT OF STATISTICS

(U) A Note on Extended Quasi-Likelihood.

DESCRIPTORS: (U) *GALLIUM ARSENIDES, ELECTROOPTICS, WAVEGUIDES.

DESCRIPTIVE NOTE: Technical rept. Aug 87-Aug 88.

IDENTIFIERS: (U) WUAFOSR230581, PE81102F.

AUG 88 18P

PERSONAL AUTHORS: Davidian, W.; Carroll, R. J.

REPORT NO. TR-7

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-88-0841

UNCLASSIFIED REPORT

ABSTRACT: (U) We study the method of extended quasi-likelihood estimation and inference of a variance function recently proposed by Nelder & Pregibon (1987). The estimates are inconsistent in general, and the test levels can be biased, but in many cases such as the exponential family the inconsistency and bias will not be a major concern. Extended quasi-likelihood is compared with Carroll & Ruppert's (1982) pseudo-likelihood method, which gives consistent estimates and, when slightly modified, asymptotically unbiased tests. We quantify the showing in this instance that the two estimates are closely related and may be asymptotically equivalent in many important cases. However, in some cases outside the exponential family, an asymptotic bias can persist. Heteroscedastic regression model. (kr)

DESCRIPTORS: (U) *ESTIMATES, CONSISTENCY, TEST AND EVALUATION, VARIATIONS, REGRESSION ANALYSIS, BIAS, ASYMPTOTIC NORMALITY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A6, *Quasi likelihood estimation.

AD-A198 061

AD-A198 042

UNCLASSIFIED

PAGE 242

EVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 041 12/7

AD-A198 040 6/4

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF ELECTRICAL
ENGINEERING AND COMPUTER SCIENCE

COLORADO STATE UNIV FORT COLLINS

(U) Fault Tolerant Parallel Implementations of Iterative
Algorithms for Optimal Control Problems.

(U) Circuit Behavior in the Development of Neuronal
Networks.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 87.

DESCRIPTIVE NOTE: Final rept. 1 Mar 87-28 Feb 88.

JAN 88 9P

FEB 88 4P

PERSONAL AUTHORS: Meyer, Gerard G.; Weinert, Howard L.

PERSONAL AUTHORS: Kater, S. B.; Hayes, Barbara C.

CONTRACT NO. AFOSR-85-0087

CONTRACT NO. AFOSR-87-0147

PROJECT NO. 2304

PROJECT NO. 2312

TASK NO. A1

TASK NO. A1

MONITOR: AFOSR
TR-88-0782

MONITOR: AFOSR
TR-88-0784

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This annual report briefly describes progress on research in algorithms for optimal control problems. The principal research focus has been on a new approach to the parallel implementation of iterative algorithms for optimal control based on a two level parametrization of optimally conditions, and a secondary research focus has been the investigation of fault detection in the type of computational networks used for optimal control computations. Publications describing the results in detail are listed.

DESCRIPTORS: (U) *FAULT TOLERANT COMPUTING, *ALGORITHMS, ITERATIONS, OPTIMIZATION, CONTROL.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A1.

ABSTRACT: (U) The goal of this research has been to devise methods for accurately recording the activity of neuronal networks. The initial objective was to obtain multi-point recordings from neurons using extracellular electrical signals. For several reasons, this methods is now regarded with some skepticism: (1) Only neurons with very fast rising action potentials have been successfully recorded from because of the high-pass characteristics of extracellular electrodes (2) Only neuronal somata can be recorded from; (3) The primary interactions between neurons are on small neurites which are not routinely accessible by these methods; (4) Stimulation through these electrodes is quite possible, however, the efficacy of stimulation is only known when an alternative recording device is in place. Optical methods have been used with success for monitoring not just the extracellular events of neurons but also the intracellular changes in toxic activity. An extremely reliable method has been also the intracellular changes in ionic activity. An extremely reliable method has been developed, using the dye Fura 2, for analyzing calcium currents, in circuit behavior. This work allows examination of the ensemble activity of specific sets of neurons given precise classes of input in order to assess the integrative qualities of the network and the specific classes of solutions to computational problems. Keywords:

AD-A198 041

AD-A198 040

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 040 CONTINUED

AD-A198 039 9/1 20/12

Nerve activity. (kt)

DESCRIPTORS: (U) *NERVE CELLS, *NEURAL NETS,
*NEUROPHYSIOLOGY, CALCIUM, DYES, INTERACTIONS, NERVES,
NETWORKS, OPERATION, OPTICAL PROPERTIES, RECORDING
SYSTEMS, RELIABILITY, STIMULATION(PHYSIOLOGY), IONIC
CURRENT, TOXICITY.

IDENTIFIERS: (U) PE811000F, WUAFOSR2312A1.

PURDUE UNIV LAFAYETTE IN SCHOOL OF ELECTRICAL ENGINEERING

(U) Investigation of a New Concept in Semiconductor
Microwave Oscillators.

DESCRIPTIVE NOTE: Annual rept. 1 May 87-30 Apr 88.

MAY 88 6P

PERSONAL AUTHORS: Cooper, James A., Jr

CONTRACT NO. AFOSR-85-0193

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-88-0781

UNCLASSIFIED REPORT

ABSTRACT: (U) The contiguous domain oscillator employs a two-dimensional electrostatic geometry to create conditions where a sequence of contiguous charge domains develop spontaneously in the channel region of an appropriately modified MESFET or MODFET device. These contiguous domains drift along the channel producing microwave oscillations in the drain current. Computer simulations indicate the device will be tunable over decades by control of the gate-to-source voltage. The ITT Gallium Arsenide Technology Center in Roanoke, VA, has fabricated two 2-inch wafers of MESFET-compatible oscillator devices for our use. Each wafer contains several thousand devices, and initial screen indicates near 100% yield at DC test. We discovered a design oversight which produced an excessive gate-to-channel voltage drop when biased to the voltages necessary for microwave testing, resulting in immediate failure of the device under these conditions. By suitable reprocessing at Purdue, we have eliminated this problem and now have devices which can withstand DC biasing at the required fields. This means we can now operate the devices in the CW mode for microwave testing. (jes)

DESCRIPTORS: (U) *SEMICONDUCTORS, *ELECTRON TRANSFER,
*SEMICONDUCTING FILMS, GALLIUM ARSENIDES, WAFERS.

AD-A198 040

AD-A198 039

UNCLASSIFIED

PAGE 244

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 039 CONTINUED

AD-A198 028 7/3

IDENTIFIERS: (U) PE81102F, WUAFOSR2305C1.

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

- (U) Transannular Cyclizations in the Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9))undecane-8,11-Dione System: A Reinvestigation.

88

PERSONAL AUTHORS: Marchand, Alan P.; Arney, Benny E., Jr.; Dave, Paritosh R.; Satyanarayana, N.; Watson, W. H.

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0733

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in the Jnl. of Organic Chemistry, V53 n11 p2844-2847 1988.

ABSTRACT: (U) As part of an ongoing program that is involved with the synthesis and chemistry of polycyclic cage compounds, we have examined some interesting imine and ketone reductions in the pentacyclo (5.4.0.0 2.6.0 3, 10.0 5,9) undecane ring system. These reductions result in the formation of heterocyclic hexacyclic cage systems via transannular cyclization reactions. Some of these reactions were studied previously by Sasaki and co-workers. As work progressed, we became aware of some discrepancies in spectral properties between compounds that we prepared and those that had been reported earlier. This led us to reexamine their earlier work in the light of our current findings. We now report the results of this reinvestigation. Keywords: Pentacycloundecanediene, Cage molecules, Reduction, Sodium borohydride, Lithium aluminum hydride, Sodium cyanoborohydride, Reprints. (MJM)

DESCRIPTORS: (U) *CLATHRATE COMPOUNDS, *IMINES, *KETONES, *POLYCYCLIC COMPOUNDS, *SODIUM BOROHYDRIDES, ALUMINUM COMPOUNDS, CHEMISTRY, LITHIUM HYDRIDE, REDUCTION, REPRINTS, RINGS, SPECTRA, SYNTHESIS(CHEMISTRY).

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2.

AD-A198 028

AD-A198 039

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 026 CONTINUED
*Pentacycloundecane.

AD-A198 022 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS
(U) A Martingale Characterization of Mixed Poisson Processes.

DESCRIPTIVE NOTE: Rept. for Sep 87-Aug 88,
87 7P

PERSONAL AUTHORS: Pfeiffer, Dietmar; Heller, Ursula

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0840

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Applied Probability.
v24 p246-251 1987.

ABSTRACT: (U) It is shown that an elementary pure birth process is a mixed Poisson process if the sequence of post-jump intensities forms a Martingale with respect to the sigma-fields generated by the jump times of the process. In this case, the post-jump intensities coverage almost surely to the mixing random variable of the process. (kr)

DESCRIPTORS: (U) *POISSON DENSITY FUNCTIONS,
*STATISTICAL PROCESSES, BIRTH, MIXING, PURITY, RANDOM VARIABLES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5, *Martingales.

AD-A198 026

AD-A198 022

UNCLASSIFIED

PAGE 245

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 021

7/3

AD-A198 020

20/5

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) An AM1 Study of the Cope Rearrangements of Bullvalene, Barbaralane, Semibullvalene, and Derivatives of Semibullvalene.

88

9P

PERSONAL AUTHORS: Dewar, Michael J.; Jife, Caoxian

CONTRACT NO. AFOSR-86-0022

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0858

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tetrahedron, v44 n5 p1351-1358 1988.

ABSTRACT: (U) The mechanism of the Cope rearrangement of 1,5-hexadiene and its derivatives has aroused much interest recently because of its implications concerning the theory of pericyclic reactions. Cope himself formulated it has what would now be called a synchronous pericyclic reaction and this interpretation was reinforced by the analysis of pericyclic reactions by Woodward and Hoffmann and by the recognition of the role of aromaticity in cyclic transition states (TS). AM1 calculations are reported for the Cope rearrangements of (3,3,2,02,8) tricyclodeca-3,7,9-triene (bullvalene; 6), (3,3,1,02,8) tricyclonona-3,7-diene (barbaralane; 7), (3,3,0,02,8) tricyclonona-3,7-diene (semibullvalene; 8), and 12 derivatives of 8. All the reactions were predicted to take place via typical aromatic pericyclic transition states, unlike chair Cope rearrangements but like the boat rearrangement of 1,5-hexadiene. Reprints. (mjm)

DESCRIPTORS: (U) *DIENES, *AROMATIC HYDROCARBONS, CYCLES, REPRINTS, TRANSITIONS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B2, *Bullvalene, *Barbaralane, *Semibullvalene, *Triene.

AD-A198 021

UNCLASSIFIED

PAGE 247

EVJ00F

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB
OF CHEMICAL PHYSICS

(U) Femtosecond Real-Time Dynamics of Photofragment-Trapping Resonances on Dissociative Potential Energy Surfaces.

MAY 88

PERSONAL AUTHORS: Rosker, Mark J.; Rose, Todd S.; Zewail, Ahmed H.

CONTRACT NO. AFOSR-87-0071

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0825

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v146 n3/4 p175-179, 6 May 88.

ABSTRACT: (U) The real time dynamics of wave packet resonance (due to photofragment trapping) in the reaction of sodium iodide is reported using femtosecond transition state spectroscopy (FTS). The observed oscillation frequency and delay give the effective vibrational frequency of the trapping well and the probability of leaving the well, respectively. The energy dependence of the wave packet oscillation provides the shape of the quasi-bound potential well in NaI. Reprints. (jhd)

DESCRIPTORS: (U) *ELECTRON SPECTROSCOPY, *PHOTODEGRADATION, DYNAMICS, ENERGY, FREQUENCY, IODIDES, OSCILLATION, POTENTIAL ENERGY, REAL TIME, REPRINTS, RESONANCE, RESPONSE, SODIUM COMPOUNDS, SPECTROSCOPY, SURFACES, VIBRATION, WAVE PACKETS, MOLECULAR VIBRATION, ELECTRON TRANSITIONS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B1, Femtosecond time, Photofragment trapping, Potential wells.

AD-A198 020

UNCLASSIFIED

PAGE 247

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 019 21/2

AD-A198 019 CONTINUED

CALIFORNIA UNIV DAVIS DEPT OF MECHANICAL ENGINEERING

(U) Theory of Nonadiabatic Flame Propagation in
Dissociation Equilibrium.

DESCRIPTIVE NOTE: Rept. for 1985-1988.

86 8P

PERSONAL AUTHORS: Chao, B. H.; Law, C. K.

CONTRACT NO. AFOSR-85-0147, DE-FG03-84ER13274

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0819

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of International
Symposium on Combustion (21st), p1793-1802 1986.

ABSTRACT: (U) In analytical studies of combustion phenomena it is frequently assumed that the reaction between fuel and oxidizer is one-step and irreversible, producing certain products whose state and composition are not specified. Implicitly, and sometimes explicitly when specific numerical values are used for quantitative studies, the combustion products are taken to be in frozen equilibrium, implying that all the available chemical energy is converted to thermal energy and that the burning is the most intense. In realistic situations, of course, product dissociation invariably occurs to various extents, thereby diminishing the amount to thermal energy available for the combustion process of interest. Effects of dissociation equilibrium and heat loss on the structure and propagation of the one-dimensional laminar flame in the doubly-infinite domain have been studied using matched asymptotic analysis in the limit of large activation energy. Analytical solutions have been obtained with an explicit expression for the burning rate eigenvalue as function of the dissociation and heat loss parameters. Results show that dissociation alone cannot cause extinction of an adiabatic flame. Extinction, however, is facilitated in

the simultaneous presence of heat loss. Salient features of the structure of both the adiabatic and nonadiabatic flames are identified. Reprints. (av)

DESCRIPTORS: (U) *DISSOCIATION, *FLAME PROPAGATION, *HEAT LOSS, ACTIVATION ENERGY, ADIABATIC CONDITIONS, ASYMPTOTIC SERIES, BURNING RATE, CHEMICAL REACTIONS, COMBUSTION, COMBUSTION PRODUCTS, CONVERSION, EIGENVALUES, ENERGY, EQUILIBRIUM(GENERAL), EXTINCTION, FLAMES, FUELS, LAMINAR FLOW, MATCHING, ONE DIMENSIONAL, OXIDIZERS, PARAMETERS, REPRINTS, SOLUTIONS(GENERAL), THERMAL RADIATION.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2.

AD-A198 019

AD-A198 019

UNCLASSIFIED

PAGE 243

EVJ00F

UNCLASSIFIED

AD-A198 018 12/3 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F
 TEXAS A AND M UNIV COLLEGE STATION DEPT OF STATISTICS AD-A198 018 CONTINUED
 (U) A Note on Second Order Effects in a Semiparametric Context. estimated. (Jhd)
 DESCRIPTORS: (U) *PARAMETRIC ANALYSIS, MATHEMATICAL ANALYSIS.
 IDENTIFIERS: (U) PEG1102F, WJAFOSR2304A6.

AUG 88 20P

PERSONAL AUTHORS: Carroll, Raymond J.; Haerdle, Wolfgang

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
 TR-88-0845

UNCLASSIFIED REPORT

ABSTRACT: (U) Consider a heteroscedastic linear regression model with normally distributed errors in which the variances depend on an exogenous variable. Suppose that the variance function can be parameterized as $\psi(z \text{ sub } 1, \theta)$ with θ unknown. If θ is any root-N consistent estimate of θ based on squared residuals, it is well known that the resulting generalized (weighted) least squares estimate with estimated weights has the same limit distribution as if θ were known. The covariance of this estimate can be expanded to terms of order $1/N$ -sq. If the variance function is unknown but smooth, the problem is adaptable, i.e., one can estimate the variance function nonparametrically in such a way that the resulting generalized least square estimate has the same first order normal limit distribution as if the variance function were completely specified. A special case is computed for an expansion for the covariance in this semiparametric context, and the rate of convergence is found to be slower for this estimate than for its parametric counterpart. More importantly, there is an effect due to how well one estimates the variance function. A kernel regression estimator is used to find that the optimal bandwidth in the problem is of the usual order, but the constant depends on the variance function as well as the particular linear combination being

AD-A198 018

AD-A198 018

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A198 007 11/4

AD-A198 007 CONTINUED

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF PHYSICS

(U) Electronic and Structural Studies of Carbon/Carbon Composites.

IDENTIFIERS: (U) WJAFOSR2303A3, PE81102F.

DESCRIPTIVE NOTE: Rept. for 1 Sep 87-30 Apr 88.

88 7P

PERSONAL AUTHORS: Doll, G. L.; Sakya, R. W.; Nicholls, J. T.; Speck, J. S.; Dresselhaus, M. S.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
YR-88-0715

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Synthetic Metals, v23 p481-486 1988.

ABSTRACT: (U) Room temperature Raman microprobe x-ray diffraction and electrical resistivity measurements have been performed on carbon/carbon composites made from mesophase pitch which were heat treated at 2680 C, 2820 C and 3015 C. Results of these measurements indicate that both the ex-pitch carbon fiber and mesophase pitch matrix constituents of the composites were highly graphitic, exhibiting in-plane crystallite dimensions (La) greater than 1000 angstroms for this range of THT values. The c-axis crystalline dimensions (Lc) were determined by analysis of x-ray diffraction peak widths to be approximately 150 angstroms. Copper chloride was successfully reacted with THT = 3020 C composites forming a stage 3 intercalation compound in both the fibers and the matrix, as determined by their Raman spectra. Keywords: Carbon composites, Carbon-carbon composites, Electronic structure, Microstructure, Raman scattering, Electrical resistivity. (jes)

DESCRIPTORS: (U) *CARBON CARBON COMPOSITES, DIFFRACTION, ELECTRICAL CONDUCTIVITY, RAMAN SPECTROSCOPY, CRYSTALS, COPPER, MICROSTRUCTURE.

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AD-A198 007

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A198 004 12/2

AD-A198 000 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

TEXAS A AND M UNIV COLLEGE STATION

(U) On Functional Estimates for Ill-Posed Linear Problems.

(U) An Asymptotic Theory for Weighted Least Squares with Weights Estimated by Replication.

DESCRIPTIVE NOTE: Rept. for Sep 87-Aug 88.

DESCRIPTIVE NOTE: Technical rept. no. 1, Aug 87-Aug 88.

APR 88 14P

AUG 88 18P

PERSONAL AUTHORS: Brigola, R.; Keller, A.

PERSONAL AUTHORS: Carroll, Raymond J.; Cline, Daren B.

REPORT NO. TR-229

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

PROJECT NO. 2304

TASK NO. A5

TASK NO. A6

MONITOR: AFOSR
TR-88-0786

MONITOR: AFOSR
TR-88-0844

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Ill-posed linear problems in Hilbert space are considered as stochastic filtering problems. Functional estimates of the signal x are given for the problem $Ax = y + z$ where A is a linear, not necessarily bounded operator between Hilbert spaces and x, y, z are Hilbert space valued random elements. As an application, functional estimates are given explicitly for J. Radon's transformed signals with additive white noise. Reprints. (edc)

DESCRIPTORS: (U) *HILBERT SPACE, *STOCHASTIC PROCESSES, LINEAR ALGEBRAIC EQUATIONS, MATHEMATICAL FILTERS, ESTIMATES, OPERATORS(MATHEMATICS), FUNCTIONAL ANALYSIS, WHITE NOISE, SIGNAL PROCESSING, REPRINTS.

IDENTIFIERS: (U) Ill posed linear problems.

ABSTRACT: (U) This document considers a heteroscedastic linear regression model with replication. To estimate the variances, one can use the sample variances or the sample average squared errors from a regression fit. The authors study the large sample properties of these weighted least squares estimates with estimated weights when the number of replicates is small. The estimates are generally inconsistent for asymmetrically distributed data. If sample variances are used based on m replicates, the weighted least squares estimates are inconsistent for $m=2$ replicates even when the data are normally distributed. With between 3 and 5 replicates, the rates of convergence are slower than the usual square root of N . With $m > 6$ replicates, the effect of estimating the weights is to increase variances by $(m-5)/(m-3)$, relative to weighted least squares estimates with known weights. (KR)

DESCRIPTORS: (U) *LEAST SQUARES METHOD, *WEIGHTING FUNCTIONS, *LINEAR REGRESSION ANALYSIS, ASYMPTOTIC SERIES, CONVERGENCE, DISTRIBUTED DATA PROCESSING, ESTIMATES, RATES, SQUARE ROOTS, WEIGHT, MATHEMATICAL MODELS, ANALYSIS OF VARIANCE.

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 997 7/3

GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

(U) Novel ((Diisopropylamino)triposphine)
hexacarbonyldiiron complexes.

DESCRIPTIVE NOTE: Journal article,

86 3P

PERSONAL AUTHORS: King, R. B.; Wu, F.-J.; Holt, E. W.

CONTRACT NO. AFOSR-84-0050

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0897

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganic Chemistry, v25 n11
p1733-1734 1988.

ABSTRACT: (U) Recently we reported the reaction of $\text{Na}_2\text{Fe}(\text{CO})_4$ with 1-Pr₂NPCl₂ in diethyl ether to give the novel phosphorus-bridging carbonyl derivative (1-Pr₂NP) $2\text{CoFe}_2(\text{CO})_6(\text{I})$. We now report that the course of this interesting reaction is highly solvent-dependent. Thus, conducting the reaction in tetrahydrofuran rather than diethyl ether leads to the novel triphosphine derivative (1-Pr₂NP) $3\text{Fe}_2(\text{CO})_6(\text{II})$ as the major product. In addition, a new type of phosphorus-bridging carbonyl derivative, namely (1-Pr₂NP) $3\text{CoFe}_2(\text{CO})_6(\text{III})$, has also been isolated from this reaction. Keywords: Iron, Triphosphine derivatives, Dialkylaminophosphorus derivatives, Metal carbonyls, Reprints. (MWW)

DESCRIPTORS: (U) *FURANS, *HYDROXYL RADICALS, *METAL CARBONYLS, *PHOSPHINE, ETHERS, ETHYL RADICALS, IRON COMPOUNDS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230382, *Iron(d1)/diisopropylamino triphosphine(hexyl carbonyl).

AD-A197 997

UNCLASSIFIED

AD-A197 998

PAGE 252

EVJ00F

AD-A197 996 20/5

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Modifying Excitation Transfer Cross Sections with an
ac Stark Effect,

MAY 88 5P

PERSONAL AUTHORS: Coutts, J.; Cooper, J.; Burnett, K.

CONTRACT NO. AFOSR-84-0027

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0898

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Optics Letters, v13 n5 p354-
356 May 88.

ABSTRACT: (U) It is possible to manipulate electronic energy transfer collision cross sections between different atomic species by using a strong electromagnetic field close to resonance with a transition between two excited states to modify the energy levels (i.e., to create dressed states), which may be placed in or out of resonance with populated states (forming a population reservoir) in one of the species. We outline an estimate for a transfer cross section for a demonstration scheme and show that cross-section enhancements up to the order of 1000 are possible. Keywords: Cross section enhancement, Energy transfer, Excitation transfer cross sections, Reprints. (JHB)

DESCRIPTORS: (U) *ENERGY TRANSFER, EXCITATION, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230381.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A197 995 11/8.1 9/1 15/5

AD-A197 994 7/8

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATERIALS
SCIENCE AND ENGINEERING

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF CHEMISTRY

(U) Role of Surface and Thin Film Composition and
Microstructure and Properties of Materials.(U) Rheological and Rheo-Optical Studies with Nematogenic
Solutions of a Rodlike Polymer: A Review of Data on
Poly (Phenylene Benzobisthiazole),

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-31 Aug 87,

87 31P

JUN 88 22P

PERSONAL AUTHORS: Berry, G. C.

PERSONAL AUTHORS: Kruger, Jerome

CONTRACT NO. F49620-85-C-1040

CONTRACT NO. AFOSR-88-0322

PROJECT NO. 2303

PROJECT NO. 2917

TASK NO. A3

TASK NO. A3

MONITOR: AFOSR
TR-88-0818MONITOR: AFOSR
TR-88-0899

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Final Report: Role of Surface and Thin Film Composition and Microstructure and Properties of Materials. After the completion of the renovation of the controlled climate room required for the surface analytical instrumentation in the summer of 1987, the Scanning Auger Microscope (SAM) and the electron spectroscopy for chemical analysis (ESCA) were installed and the new Surface Analytical Laboratory (SAL) containing this equipment became operational in November 1987. Keywords: Military research. (jes)

DESCRIPTORS: (U) *THIN FILMS, *MICROSTRUCTURE, *LOGISTICS, SCANNING, ELECTRON SPECTROSCOPY, MILITARY RESEARCH.

IDENTIFIERS: (U) PE81102F, WUAFOSR2917A3.

ABSTRACT: (U) Rheological and rheo-optical studies on isotropic and nematic solutions of poly(1,4-phenylene-2,6-benzobisthiazole), PBT, are reviewed. The linear viscoelastic behavior is compared with theoretical models for the isotropic data; comparisons with theoretical models are made. With the nematic solutions, nonlinear viscoelastic behavior is found even for very slow shearing deformations. This behavior may be related to orientation effects at the bounding surfaces. For more rapid shearing deformations, the bulk of the fluid is strongly oriented, similar to the orientation obtained in the isotropic fluid at high rates of shearing deformation. Comparisons are made among a number of rheological properties for isotropic and nematic solutions for the latter flows. Polymers, Thiazoles, Reprints. (mjm)

DESCRIPTORS: (U) *POLYMERS, *RHEOLOGY, *THIAZOLES, BEHAVIOR, DEFORMATION, FLUIDS, HIGH RATE, ISOTROPISM, LINEARITY, LIQUID CRYSTALS, MODELS, NONLINEAR SYSTEMS, OPTICAL PROPERTIES, ORIENTATION(DIRECTION), REPRINTS, SOLUTIONS(GENERAL), THEORY, VISCOELASTICITY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3, *Thiazole/phenylene benzobis.

AD-A197 995

AD-A197 994

UNCLASSIFIED

PAGE 253

CVJ00F

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 980 6/4 8/1 6/2

AD-A197 953 7/3

BAYLOR COLL OF MEDICINE HOUSTON TX

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Norepinephrine Enhances Long-Term Potentiation at Hippocampal Mossy Fiber Synapses.

(U) Theoretical Studies of Silabicyclobutanes and Silacyclobutenes, $CnSi(4-n)H_8$ ($n = 0-4$).

88 5P

88 7P

PERSONAL AUTHORS: Johnston, Daniel; Hopkins, W. F.; Gray, R.

PERSONAL AUTHORS: Boatz, Jerry A.; Gordon, Mark S.

CONTRACT NO. AFOSR-85-0178, SPHS-NS-15772

CONTRACT NO. AFOSR-87-0049

PROJECT NO. 2312

PROJECT NO. 2303

TASK NO. A2

TASK NO. B3

MONITOR: AFOSR TR-88-0736

MONITOR: AFOSR TR-88-0700

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Synaptic Plasticity in the Hippocampus, p57-60 1988.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry. V92 n11 p3037-3042 1988.

ABSTRACT: (U) Mossy fiber synapses have a number of relatively unique features, one of which relates to the finding that long-term potentiation (LTP) at these synapses is not dependent on NMDA receptors. Norepinephrine, through beta-adrenoceptors, can increase the magnitude, duration, and probability of induction of LTP at mossy fiber synapses. Results of experiments in which we injected cAMP analogs into the postsynaptic neuron and others in which we recorded the activity of single calcium channels suggest that the NE enhancement of LTP takes place postsynaptically through increased calcium influx. Keywords: Mossy fiber synapses, Norepinephrine, Hippocampus, Long-Term potentiation, Calcium channels, Nerve transmission. (kt)

ABSTRACT: (U) The geometries of the silicon substituted bicyclobutanes and cyclobutenes $CnSi4-nH_8$ are predicted by using the 3-21G(d) basis set and SCF wave functions. Strain energies and heats of formation are predicted by using MP2/8-31G(d) energies in conjunction with the appropriate homodesmic reactions. Bent bond lengths are calculated by tracing the path of maximum electron density connecting two nuclei, with the 8-31G(2d) basis set at the 3-21G(d) structures. Butanes, Butenes, Reprints. (mjm)

DESCRIPTORS: (U) *POTENTIAL ENERGY, *LEVARTERENOL, *NERVE TRANSMISSION, ANALOGS, CALCIUM, CHANNELS, FACILITIES, HIPPOCAMPUS, SYNAPSE.

DESCRIPTORS: (U) *BUTANES, *BUTENES, *CYCLOBUTANES, *SILICON, BONDING, LENGTH, REPRINTS, SUBSTITUTES, THEORY, WAVE FUNCTIONS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2312A2, *Norepinephrine, *Mossy fiber synapses, Calcium channels, *Long term potentiation.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B3, *Cyclobutenes.

AD-A197 980

AD-A197 953

UNCLASSIFIED

PAGE 254

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 949 7/5

OREGON UNIV EUGENE DEPT OF CHEMISTRY

(U) Powerful Photogenerated Reducing Agents.

DESCRIPTIVE NOTE: Final rept. 1 Apr 86-31 Mar 88.

JUL 88 13P

PERSONAL AUTHORS: Tyler, David

CONTRACT NO. AFOSR-86-0081

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0743

UNCLASSIFIED REPORT

ABSTRACT: (U) An investigation of the reducing abilities of photochemically-generated 19-electron complexes was accomplished. The investigation had four primary objectives: (1) study the capabilities and limitations of the 19-electron complexes as reducing agents; (2) synthesize or produce water-soluble 19-electron complexes; (3) recycle the 19-electron reducing agents so as to make these species catalytic reductants; and (4) use the 19-electron reductants to perform chemically interesting transformations. (JES)

DESCRIPTORS: (U) *COMPLEX IONS, PHOTOSYNTHESIS, SYNTHESIS(CHEMISTRY).

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2.

AD-A197 949

UNCLASSIFIED

PAGE 25

EVJ00F

AD-A197 928 11/2 11/6.1

CORNELL UNIV ITHACA NY DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Bonding at Metal-Ceramic Interfaces in Hybrid Materials.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 86-30 Nov 87.

JUN 88

PERSONAL AUTHORS: Raj, Rishi

CONTRACT NO. AFOSR-86-0321

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-88-0788

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research project is to investigate the fundamental mechanical properties of the metal-ceramic interface, and to relate those properties to the atomic structure of interface. Until this point we have emphasized the development of innovative techniques for (i) measuring the shear strength of the interface, and (ii) the interfacial energy of the metal-ceramic interface. In the present phase these techniques are being applied to model metal-ceramic systems. The ultimate shear strength of the silica-copper interface has been measured to be in the range 570 MPa to 1670 MPa. This interface had been suspected to be strong but these are the first quantitative measurements of its shear strength. The interfacial energy of the interface is being measured by measuring the contact angle between the metal and the ceramic. It has been found that poor wetting between the copper-alumina interface causes the copper film to become unstable and break up into small spheres. Keywords: Interfaces, Metal-ceramic, Composites. (Jes)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *MICROSTRUCTURE, COPPER, SHEAR STRENGTH, COMPOSITE MATERIALS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2306A1.

AD-A197 928

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 928 CONTINUED

AD-A197 923 12/3

IAC NO. WMC-702959

CALIFORNIA UNIV RIVERSIDE DEPT OF STATISTICS

(U) Efficient Nearly Orthogonal Deletion Designs.

IAC DOCUMENT TYPE: NMCIAC - HARD COPY --

DESCRIPTIVE NOTE: Technical rept. Dec 87-Apr 88.

APR 88 21P

PERSONAL AUTHORS: Ghosh, Subir; Mahoney, Joan

REPORT NO. TR-188

CONTRACT NO. AFOSR-88-0092

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0782

UNCLASSIFIED REPORT

ABSTRACT: (U) There is a vast literature on the construction of orthogonal single replicate factorial designs in incomplete blocks. The reader is referred to Voss for the list of references. The concept of deletion designs was introduced in Kishen and Srivastava. The deletion technique in deletion designs was then used by many authors. This article considers deletion designs in three incomplete blocks and then presents a systematic method for finding the u.e. (unbiasedly estimable) and n. u.e. (not unbiasedly estimable) factorial effects. For n. u.e. factorial effects, the biased estimators (biased w.r. t block effects) are called the unadjusted estimators. Under the assumption that certain higher order interactions are negligible, the unbiased estimation of block effects contrasts and n.u.e. factorial effects, excluding the general mean, are possible. This makes the deletion design an orthogonal design. The unbiased estimators of n.u.e. factorial effects under the assumption are called the adjusted estimators. The relative efficiency in the estimation of a factorial effect is the ratio of the variance of the unadjusted estimator divided by the variance of the adjusted estimator. (kr)

DESCRIPTORS: (U) *FACTORIAL DESIGN, CONSTRUCTION.

AD-A197 923

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 923 CONTINUED

AD-A197 922 11/8

DOCUMENTS, EFFICIENCY, ESTIMATES, INTERACTIONS, MEAN,
ORTHOGONALITY, RATIOS, VARIATIONS, BIAS.

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

IDENTIFIERS: (U) PE81102F, WJAFOSR2304A5, Block design.

(U) AM1 Parameters for Zinc,

88

5P

PERSONAL AUTHORS: Dewar, Michael J.; Merz, Kenneth M.,
Jr

CONTRACT NO. AFOSR-88-0022

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0857

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organometallics, v7 n2 p522-
524 1988.

ABSTRACT: (U) In our continuing effort to improve semiempirical molecular models we have developed a new 'third generation' method, AM1. AM1 parameters for the 'organic' elements (CHON) and silicon have already been reported while those for the halogens and boron are in course of publication. Here we present optimized AM1 parameters for zinc. We decided to parametrize AM1 for zinc for several reasons: first, because organozinc chemistry is not only interesting and varied but has also played an important role in synthetic and mechanistic organic chemistry; second, because zinc is a metal and, at the time we began this work, AM1 parameters were not available for any metals; third, because zinc is important in a number of biological systems. Procedure: The AM1 parameters for zinc were determined by a least-squares fit of the values calculated for various properties of a selected set (basis set) of molecules to experiments, using standard AM1 parameters for other elements and a recently described optimization procedure. Reprints. (jes)

DESCRIPTORS: (U) *METALS, BIOLOGY, BORON, CHEMISTRY,
HALOGENS, MODELS, MOLECULES, OPTIMIZATION, ORGANIC
CHEMISTRY, REPRINTS, SILICON, ZINC.

AD-A197 923

AD-A197 922

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 922 CONTINUED

AD-A197 921 12/1

IDENTIFIERS: (U) PE61102F, WJAFOSR2303B2.

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J

(U) Nonlinear Discrete-Time Systems: Algebraic Theory.

DESCRIPTIVE NOTE: Rept. for 15 Jul 87-14 Jul 88,

MAY 88 11P

PERSONAL AUTHORS: Sontag, Eduardo D.

CONTRACT NO. AFOSR-85-0247, SAFOSR-80-0198

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0781

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Systems and Control
Encyclopedia: Theory, Technology, Applications, p3288-
3294 1988. Sponsored by Grant AFOSR-85-0186E.

ABSTRACT: (U) In many applications, particularly those
involving digital control, it is of interest to consider
plant behavior at special time instants t sub 0, t sub 1,
 t sub 2, ...; often these times are equispaced: t sub k =
 t sub 0 + k delta, where delta is the sampling period
being used. In other cases, systems evolving in discrete
time are the most natural model at the desired resolution
level. These facts motivate the study of discrete-time
(dt) systems, models which are mathematically describe by
sets of difference (as opposed to differential) evolution
equations. Keywords: Polynomials, Reprints. (kr)

DESCRIPTORS: (U) *ALGEBRA, *NONLINEAR SYSTEMS, CONTROL,
DIGITAL SYSTEMS, DIFFERENCE EQUATIONS, EVOLUTION(GENERAL),
POLYNOMIALS, REPRINTS, RESOLUTION, SAMPLING, THEORY, TIME,
TIME INTERVALS.

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A1.

AD-A197 922

AD-A197 921

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A197 920 12/2

AD-A197 917 20/11

TENNESSEE UNIV KNOXVILLE DEPT OF MATHEMATICS

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

(U) Remarks on the Positivity of Densities of Stable Probability Measure on $R(d)$.

(U) Integration of Statistical and Physical Models of Short Fatigue Crack Growth.

DESCRIPTIVE NOTE: Rept. for Apr 87-Apr 88.

DESCRIPTIVE NOTE: Final rept. 15 Jan 85-14 Apr 88.

APR 88 14P

JUN 88 139P

PERSONAL AUTHORS: Rajput, Balram S.

PERSONAL AUTHORS: Cox, B. N.; Morris, W. L.

CONTRACT NO. AFOSR-87-0133

REPORT NO. SC5418.FR

PROJECT NO. 2304

CONTRACT NO. F49620-85-C-0034

TASK NO. A5

PROJECT NO. 2302

MONITOR: AFOSR
TR-88-0763

TASK NO. B2

MONITOR: AFOSR
TR-88-0690

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Let μ be an index α , $0 < \alpha < 2$, stable prob. measure on R superscript d , the d -Euclidean space. Let σ be the spectral measure of μ on the boundary of the unit sphere of R superscript d ; and assume that the support of σ is d -dimensional. Using known results about the support of μ , simple proofs are provided for the following two facts about the continuous bounded density f sub μ of μ : (i) If $1 < \alpha$ or $\alpha < 2$, then f sub μ is positive on R superscript d ; (ii) if $0 < \alpha < 1$, then f sub μ (x) > 0 if and only if x belongs to the interior of the translated cone a sub $0 + C$ sub 0 , where C sub 0 is the smallest closed cone generated by the support of σ , and a sub 0 is the centering element of μ . (jnd)

DESCRIPTORS: (U) *PROBABILITY, *FUNCTIONAL ANALYSIS, CONICAL BODIES, SPECTRA, SPHERES, STABILITY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5.

ABSTRACT: (U) The probabilistic analysis of the propagation of small fatigue cracks has been investigated. Monte Carlo simulations have been formulated that can embrace nearly all details of the micromechanics of small crack growth. They calculate the propagation of the entire, irregular crack front as it passes through a random microstructure. The simulations illuminate both the mechanics and the statistics of small crack growth. A computationally efficient probabilistic model has also been formulated as the basis of lifetime prediction in field application. The probabilistic model is sufficiently flexible to allow incorporation of the physical aspects of propagation that have been shown in the Monte Carlo simulations to be necessary for accurate predictions. In particular, the probabilistic model begins with the premise that two independent variables, for example but not necessarily the crack length and the crack shape, are required to account for the observed statistics of growth. (jes)

DESCRIPTORS: (U) *FATIGUE (MECHANICS), *CRACKS, MONTE CARLO METHOD, SIMULATION.

IDENTIFIERS: (U) PE81102F, WUAFOSR230282.

AD-A197 920

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 916 20/8 9/5

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF
ELECTRICAL ENGINEERING

(U) Studies of Optical Wave Front Conjugation and Imaging
Properties of Nematic Liquid Crystal Films.

DESCRIPTIVE NOTE: Final rept. 15 Aug 84-14 May 88.

JUN 88 138P

PERSONAL AUTHORS: Khoo, Kuan-Choon

CONTRACT NO. AFOSR-84-03715

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR
TR-88-0741

UNCLASSIFIED REPORT

ABSTRACT: (U) Optical nonlinearities of liquid crystals owing to laser induced molecular reorientation or laser induced thermal index change, were studied in the context of optical wave mixings and real time imagings. The basic mechanisms and the dynamics of the nonlinearities were studied in detail in theories, and in experiments using lasers of various time scales and temporal characteristics. Quantitative documentation of nanosecond laser induced thermal grating was performed for the first time, and further established the optical images to visible images via real time optical wave mixing processes was also demonstrated. The capability of optical four wave mixing to generate amplified reflection and self-oscillation in nematic liquid crystal film was also demonstrated for the first time. Such a process will be useful for image processing as well as laser oscillator adaptive optics applications. New optical intensity switching effects and optical beam amplifications and infrared laser wave mixings were also experimentally demonstrated, that will find application in optical switching, image processing and power self limiting devices. (jhd)

DESCRIPTORS: (U) *IMAGE PROCESSING, *LIQUID CRYSTALS,
*OPTICAL SWITCHING, AMPLIFICATION, DYNAMICS, FILMS,

AD-A197 916

AD-A197 916

UNCLASSIFIED

PAGE 280

EVJ00F

AD-A197 916 CONTINUED

GRATINGS(SPECTRA), IMAGES, INFRARED LASERS, LASERS,
LIMITATIONS, NONLINEAR SYSTEMS, OPTICAL IMAGES, OPTICAL
PROPERTIES, POWER, REAL TIME, REFLECTION, THERMAL
PROPERTIES, VISIBLE SPECTRA, WAVEFRONTS.

IDENTIFIERS: (U) PEB1102F, WUAFOSR230584, Four wave
mixing, Wave front conjugation, Liquid crystal films,
Adaptive optics.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A197 900 7/2

OREGON UNIV EUGENE DEPT OF CHEMISTRY

(U) Photochemical Disproportionation Reactions of the $W_2(CO)_{10}(2-)$ and $Fe_2(CO)_8(2-)$ Complexes.

88 7P

PERSONAL AUTHORS: Silavwe, Ned D.; Pan, Xiong; Tyler, David R.

CONTRACT NO. AFOSR-86-0081

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0752

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inorganica Chimica Acta, v144 p123-128 1988.

ABSTRACT: (U) Irradiation of the $W_2(CO)_{10}^{2-}$ complex in the presence of phosphines results in disproportionation of the dimer according to the following reaction: $W_2(CO)_{10}^{2-} + PR_3 \rightarrow W(CO)_5PR_3 + W(CO)_5^{2-}$. The quantum yield for this process is about 0.06. Unlike the analogous reactions of neutral metal-metal bonded dimers, the $W_2(CO)_{10}^{2-}$ complex does not disproportionate with I^- . $Fe_2(CO)_9^{2-}$ disproportionates in a similar fashion: $Fe_2(CO)_9^{2-} + PR_3 \rightarrow Fe(CO)_4PR_3 + HFe(CO)_4^{2-}$. The $HFe(CO)_4^{2-}$ product forms in these reactions rather than $Fe(CO)_4^{2-}$ unless rigorous precautions are taken to exclude H_2O . The data are consistent with a radical chain mechanism for the disproportionation reactions, analogous to the chain mechanisms proposed for the disproportionation reactions of neutral metal-metal bonded dimers. Keywords: Nineteen, Electron complexes, Photochemistry, Disproportionation, Iron compounds, Tungsten. (mjm)

DESCRIPTORS: (U) *DIMERS, *DISPROPORTIONATION, *IRON COMPOUNDS, *PHOSPHINE, *TUNGSTEN, *CARBON MONOXIDE, CHAINS, ELECTRONS, PHOTOCHEMICAL REACTIONS, QUANTUM THEORY, YIELD.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2.

AD-A197 900

AD-A197 899 7/2 9/1 11/8.2

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

(U) Research on Sputtering of Ferroelectric Thin Films.

DESCRIPTIVE NOTE: Annual technical rept. 1 May 87-30 Apr 88.

JUN 88 62P

PERSONAL AUTHORS: Neurgaonkar, R. R.

REPORT NO. SC5458.ATR

CONTRACT NO. F49620-86-C-0052

PROJECT NO. 2308

TASK NO. B1

MONITOR: AFOSR
TR-88-0689

UNCLASSIFIED REPORT

ABSTRACT: (U) The magnetron sputting technique has been used to grow ferroelectric thin films of tungsten bronze (T.B.) $Pb_{0.8}Ni_{0.2}$ and $Sb_{0.75}Ni_{0.25}$ and perovskite PLZT. Film crystallinity was found to be strongly influenced by substrate temperature, with temperatures of 500-800 C usually required. Polycrystalline films were grown on quartz, sapphire and glass substrates, whereas oriented crystalline films of $Pb_{0.8}Ni_{0.2}$ and $Sb_{0.75}Ni_{0.25}$ were achieved with PLZT films grown on $Sb_{0.75}Ni_{0.25}$ substrates are grain-oriented along the (100)-orientation and have excellent surface texture. This is the first time such films have been grown on T.B. substrates. Keywords: Magnetron sputtering, Ferroelectric, Thin films, Lattice matched substrates, Electro optics.

DESCRIPTORS: (U) *BRONZE, *QUARTZ, *SPUTTERING, *THIN FILMS, CRYSTALS, ELECTROOPTICS, FERROELECTRIC MATERIALS, FILMS, GLASS, MAGNETRONS, POLYCRYSTALLINE, SAPPHIRE, SUBSTRATES, SURFACE PROPERTIES, TEMPERATURE, TEXTURE, TUNGSTEN.

IDENTIFIERS: (U) PE81102F, WUAFOSR2306B1

AD-A197 899

UNCLASSIFIED

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 885 CONTINUED

AD-A197 885 7/3 7/5

OREGON UNIV EUGENE DEPT OF CHEMISTRY

(U) Photochemical Generation of Nineteen-Electron Organometallic Complexes and Their Use as Reducing Agents in Micellar Systems.

IDENTIFIERS: (U) *Reducing agents, PE81102F, WUAFOSR230382.

87 SP

PERSONAL AUTHORS: Tyler, D. R.; MacKenzie, V.; Goldman, A. S.

CONTRACT NO. AFOSR-86-0081

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0749

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the International Conference on the Photochemistry and Photophysics of Coordination Complexes (7th), p283-288 1987.

ABSTRACT: (U) We have discovered a new class of organometallic complexes that are very powerful reducing agents. In some cases these reducing agents have oxidation potentials up to approx. 2 volts (vs NHE). In addition to being quite powerful, the reducing agents are very versatile and they are easy to generate. Their versatility is demonstrated by their ability to reduce a wide variety of complexes, including organics, inorganics, classical coordination complexes, and organometallic species. Furthermore the reduction reactions can be carried out in aqueous or non-aqueous solvents. Perhaps the most remarkable feature of these reducing agents is their ease of generation; these species form simply by irradiating a metal-metal bonded carbonyl dimer in the presence of an appropriate ligand. Keywords: Photochemical reactions, Reprints. (av)

DESCRIPTORS: (U) *ORGANOMETALLIC COMPOUNDS, *PHOTOCHEMICAL REACTIONS, COLLOIDS, LIQUIDS, NONAQUEOUS ELECTROLYTES, OXIDATION, POTENTIAL THEORY, REDUCTION(CHEMISTRY), REPRINTS, SOLVENTS.

AD-A197 885

UNCLASSIFIED

PAGE 282

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 884 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) A Dimer Ketone Formed via Fe(CO)5-Promoted Coupling of 7-Phenoxynorbornadiene to Carbon Monoxide.

88 4P

PERSONAL AUTHORS: Watson, William H.; Marchand, Alan P.; Dave, Paritosh R.

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0732

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Crystallographica, VC44
p940-942 1988.

ABSTRACT: (U) The single crystal X-ray structure of the syn,exo,trans,endo, syn dimer ketone which is formed via iron carbonyl-promoted coupling of 7-phenoxynorbornadiene to carbon monoxide is reported. Keywords: Iron pentacarbonyl, 7-phenoxynorbornadiene, Alkenes, Carbon monoxide, Reprints. (aw)

DESCRIPTORS: (U) *DIMERS, *KETONES, *SYNTHESIS(CHEMISTRY), *COUPLING(INTERACTION), ALKENES, CARBON MONOXIDE, REPRINTS, SINGLE CRYSTALS, X RAYS, CARBONYL COMPOUNDS, IRON COMPOUNDS, DIENES.

IDENTIFIERS: (U) Iron pentacarbonyl, Phenoxynorbornadienes.

AD-A197 874 7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Anionic Ring-Opening Polymerization of Sila- and Germacyclopent-3-enes.

88 5P

PERSONAL AUTHORS: Zhang, Xuehai; Zhou, Qingshan; Weber, William P.; Horvath, Raymond F.; Chan, T. H.

CONTRACT NO. AFOSR-88-0042

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0708

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Macromolecules, v21 p1583-1586 1988.

ABSTRACT: (U) Both 1,1-dimethyl-1-silacyclopent-3-ene (I) and 1,1-dimethyl-1-germacyclopent-3-ene (II) have been reported to undergo ring-opening metathesis polymerizations to yield low molecular weight materials. Anionic ring opening polymerization of I has been recently reported. We would like to report a general stereospecific anionic polymerization of sila- and germacyclopent-3-enes which in the case of I yields high molecular weight material. Thus treatment of I with a catalytic amount of n-butyllithium and either hexamethylphosphoramide (HMPA) or N,N,N',N'-tetramethylethylenediamine (TMEDA) as cocatalyst in THF gave poly(1,1-dimethyl-1-sila-cis-pent-3-ene) in 92% yield. Reprints, Cyclopentenes. (mjm)

DESCRIPTORS: (U) *CYCLOPENTENES, *POLYMERIZATION, *GERMANIUM COMPOUNDS, AMIDES, ANIONS, CHEMICAL REACTIONS, METHYL RADICALS, OPENING(PROCESS), PHOSPHORS, REPRINTS, RINGS.

IDENTIFIERS: (U) WUAFCSR230382, PE81102F, *Cyclopentenes/Germa.

AD-A197 884

AD-A197 874

UNCLASSIFIED

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 871 9/3

AD-A197 871 CONTINUED

STATE UNIV OF NEW YORK AT BROOKLYN

(U) Theory of Laser-Pulse-Induced Molecular Dynamics: Gas-Phase Molecular Collisions and Adbond Dynamics,

OSCILLATION, POPULATION, PULSED LASERS, RADIATIVE TRANSFER, REPRINTS, SHORT PULSES, SURFACES, TRANSITIONS.

IDENTIFIERS: (U) WJAFOSR230383, PE81102F.

88 10P

PERSONAL AUTHORS: Lee, Kai-Woong; Van Smaalen, Sander; George, Thomas F.

REPORT NO. TR-69

CONTRACT NO. F49620-88-C-0006, NSF-CHE85-12408

PROJECT NO. 2303

TASK NO. 83

MONITOR: AFOSR
YR-88-0727

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Atomic and Molecular Processes with Short Intense Laser Pulses, V171 p87-95 1988.

ABSTRACT: (U) A semiclassical study presented here indicates that a sufficiently short and intense pulse can be much more effective in inducing a collisional radiative transition than cw radiation or a long pulse, although the intensity must not be too high because the Rabi oscillation can bring down the probability. For the situation of a molecule physisorbed on a crystalline surface and irradiated by a laser, a master equation approach, used to describe the time evolution of the population of the vibrational adbond levels, shows that for high intensities laser induced vibrational excitation is the same for pulsed and cw lasers. Keywords: Molecular dynamics, Laser induced, Short pulses, Molecular collisions, Electron transitions, Desorption, Reprints. (Jhd)

DESCRIPTORS: (U) *DESORPTION, *ADATOMS, *LASER TARGET INTERACTIONS, COLLISIONS, CONTINUOUS WAVE LASERS, CRYSTALS, ELECTRON TRANSITIONS, EVOLUTION(GENERAL), INTENSITY, LASER BEAMS, LIGHT PULSES, MOLECULAR PROPERTIES, TIME STUDIES, MOLECULE MOLECULE INTERACTIONS.

AD-A197 871

AD-A197 871

UNCLASSIFIED

PAGE 264

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 870 7/2 7/4

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) DIET in the Second Layer: An ESDIAD (Electron Stimulated Desorption Ion Angular Distribution) Study of NH₃ on a CO Layer on Ni(111) and Ni(110).

88 4P

PERSONAL AUTHORS: Dresser, M. J.; Lanzillotto, A.-M.; Alvey, M. D.; Yates, J. T., Jr

CONTRACT NO. AFOSR-88-0107

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-88-0885

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Desorption Induced by Electronic Transitions (DIET III), Springer Series in Surface Science, v13 p115-119 1988.

ABSTRACT: (U) We have recently reported on the interactions of CO and NH₃ on nickel surfaces, as determined by the electron stimulated desorption ion angular distribution (ESDIAD) method. In this paper we review that work and present the results of calculations that show the role of the CO layer in DIET phenomena. Tochihara et al. have also studied this system using XPS spectroscopy, and their results are of importance in our conclusions. Our interest here concerns ESDIAD from ammonia adsorbed on top of the saturated layer of CO on both the (111) or (110) surfaces of nickel. The work of Tochihara et al. was the first to demonstrate that ammonia adsorbs on the surface of a CO monolayer. This observation was also confirmed by this laboratory where it was found that strong H signals arose from the ESD of adsorbed NH₃ above the CO monolayer. Reprints. (jes)

DESCRIPTORS: (U) *CARBON MONOXIDE, *AMMONIA, *DESORPTION, *ELECTROCHEMISTRY, IONS, NICKEL, SURFACE PROPERTIES.

IDENTIFIERS: (U) WJAFOSR2303A2, PE81102F.

AD-A197 870

UNCLASSIFIED

AD-A197 869 7/2

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) A Convenient Synthesis of Alkali Metal Selenides and Diselenides in Tetrahydrofuran and the Reactivity Differences Exhibited by These Salts toward Organic Bromides. Effect of Ultrasound.

88 5P

PERSONAL AUTHORS: Boudjouk, Philip

CONTRACT NO. AFOSR-84-0008

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0710

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in the Jnl. of Organic Chemistry, v53 p2109-2112 1988.

ABSTRACT: (U) The synthesis of lithium, sodium, and potassium selenides and diselenides in tetrahydrofuran by the reduction of selenium with the alkali metal can be accomplished in the presence of a small amount of soluble charge transfer agent such as naphthalene. This provides a convenient procedure for the production of lithium, sodium, and potassium selenides and diselenides in tetrahydrofuran. Ultrasound accelerates these reductions substantially over room temperature stirring. Lithium, sodium, and potassium selenides and diselenides produced in this manner exhibit significant reactivity differences toward alkyl bromides in tetrahydrofuran. Keywords: Alkali metal selenides, Diselenides, Sonochemistry, Lithium selenide, Sodium selenide, Potassium selenide. (jes)

DESCRIPTORS: (U) *ALKALI METAL COMPOUNDS, LITHIUM, SODIUM, POTASSIUM, SELENIDES, FURANS, SYNTHESIS(CHEMISTRY), BROMINE.

IDENTIFIERS: (U) WJAFOSR2303B2, PE81102F.

AD-A197 869

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 790 25/2

COLLEGE OF WILLIAM AND MARY WILLIAMSBURG VA DEPT OF
MATHEMATICS AND COMPUTER SCIENCE

(U) A New Algorithm for Performance Analysis of
Communication Systems.

APR 88 6P

PERSONAL AUTHORS: Shier, D. R.

CONTRACT NO. AFOSR-84-0154

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0772

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Communications, v36 n4 p528-519 Apr 88. Presented at the
IEEE INFOCOM Conference, San Francisco, CA, Apr 87.

ABSTRACT: (U) This paper presents a new algorithm for
generating in order the most likely states of a
probabilistic system, thus enabling a more rapid
procedure for analyzing the performance of communication
networks with stochastically failing components. The
algorithm improves upon the algorithm recently reported
in Lam and Li (1988), both in terms of storage
requirements and execution efficiency. Reprints. (fr)

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS,
*COMMUNICATIONS NETWORKS, ALGORITHMS, EFFICIENCY,
PERFORMANCE TESTS, PROBABILITY, REPRINTS, REQUIREMENTS,
STORAGE.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5.

AD-A197 790

UNCLASSIFIED

PAGE 77

EVJ00F

AD-A197 771 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Estimating Random Integrals from Noisy Observations:
Sampling Designs and Their Performance.

DESCRIPTIVE NOTE: Rept. for Jan 87-Jan 88,

JAN 88 19P

PERSONAL AUTHORS: Bucklew, James A.; Cambanis, Stamatis

CONTRACT NO. F49620-85-C-0144, F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0724

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on
Information Theory, v34 n1 p111-127 Jan 88.

ABSTRACT: (U) The problem of estimating a weighted
average of a random process from noisy observations at a
finite number of sampling points is considered. The
performance of sampling designs with optimal or
suboptimal, but easily computable, estimator coefficients
is studied. Several examples and special cases are
studied including additive independent noise, nonlinear
distortion with noise, and quantization noise. Keywords:
Reprints. (kr)

DESCRIPTORS: (U) *ESTIMATES, *INTEGRALS, COEFFICIENTS,
DISTORTION, NOISE, NONLINEAR SYSTEMS, QUANTIZATION,
REPRINTS, SAMPLING, STATISTICAL SAMPLES.

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F.

AD-A197 771

UNCLASSIFIED

DYIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 765

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AD-A197 759

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NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Potentially Aromatic Metallocycles.

88

6P

PERSONAL AUTHORS: Baldridge, Kim K.; Gordon, Mark S.

CONTRACT NO. AFOSR-87-0045, NSF-CHE86-40771

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0899

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical Society, v110 p4204-4208 1988.

ABSTRACT: (U) Ab initio molecular orbital theory is used to characterize a series of metal-substituted benzene and cyclopentadiene structures, with the heteroatom taken from the block in the periodic table bounded by groups IV-VI and periods 2-5. Structures are predicted with the 3-21G* basis set and SCF wave functions. The calculated bond lengths and bond angles are in general within 0.04 Å and 2°, respectively, of the available experimental values. As a measure of the delocalization stabilization, delta E and delta H0 values for the appropriate bond separation and superhomodesmotic reactions are calculated with 3-21G* Hartree-Fock energies for these compounds and some smaller acyclic structures. Keywords: Aromatic hydrocarbons, Reprints. (U) (U) (U)

DESCRIPTORS: (U) *AROMATIC HYDROCARBONS, *CYCLOPENTENES, *PENTADIENES, *BENZENE COMPOUNDS, ANGLES, BONDING, LENGTH, MOLECULAR ORBITALS, REPRINTS, SEPARATION, STRUCTURES, TABLES(DATA), THEORY, VALUE, WAVE FUNCTIONS.

IDENTIFIERS: (U) WUAFOSR2303B3, PE81102F.

AD-A197 765

UNCLASSIFIED

PAGE 265

EVJ00F

MAINE UNIV AT ORONO LAB FOR SURFACE SCIENCE AND TECHNOLOGY

(U) Diffusion at Interfaces: Microscopic Concepts. Proceedings of a Workshop Held in Campobello Island, Canada on August 18-22 1987. Springer Series in Surface Sciences. Volume 12.

DESCRIPTIVE NOTE: Final Rept.,

88

PERSONAL AUTHORS: Grunze, M.; Kreuzer, H. J.; Weimer, J.

CONTRACT NO. N00014-87-G-0181, AFOSR-87-0325

MONITOR: AFOSR
TR-88-089

UNCLASSIFIED REPORT

Availability: Springer Verlag, 44 Hartz Way, Secaucus, NJ 07094 HC \$59.50. No copies furnished by DTIC/NTIS.

ABSTRACT: (U) Partial contents: Diffusion at the Vacuum-Solid and gas-Solid Interface; Surface Diffusion Measured Using Laser Induced Thermal Desorption; Hydrogen on Ru(001); Reflection High Energy Electron Diffraction Studies of Diffusion and Cluster Formation During Molecular Beam Epitaxy; Laser-Induced Desorption Determinations of Surface Diffusion on Rh(111); Mobility of Rare Gases Adsorbed on the (001) Surface of MgO; Comparison of Equilibrium and Non-Equilibrium Diffusion Measurements for W(110)p(2x1)-O; Hopping and Diffusion; Diffusion at the Solid-Solid Interface; Surface Segregation and Bulk Diffusion; Direct Observation of Atomic Motion on Surfaces; Topography Modification and Microscopic Motion on Metal Surfaces; Surface Self-Diffusion, Capillarity, and Surface Steps; Radiation Enhanced Diffusion (RED) in a Sputtered Ag/Ni Layered System; The Influence of segregation on the Formation of Cu/Ni Alloy Films by Means of Evaporation; Theoretical Models for Segregation and Diffusion; Nucleation at the Solid-Liquid Interface. (AW)

DESCRIPTORS: (U) *DIFFUSION, *SURFACE CHEMISTRY, ALLOYS, CANADA, CAPILLARITY, CLUSTERING, COMPARISON, DESORPTION,

AD-A197 759

PAGE 266

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A197 759

CONTINUED

AD-A197 758

7/5

DIFFUSION COEFFICIENT, EPITAXIAL GROWTH, EQUILIBRIUM(GENERAL), EVAPORATION, FILMS, GASES, INTERFACES, LASERS, LAYERS, LIQUIDS, MEASUREMENT, METALS, MICROSCOPY, MOBILITY, MODELS, MODIFICATION, MOLECULAR BEAMS, NONEQUILIBRIUM FLOW, NUCLEATION, RARE GASES, SEGREGATION(METALLURGY), SOLIDS, SURFACES, THEORY, THERMAL RADIATION, TOPOGRAPHY, WORKSHOPS, ADSORPTION.

COLUMBIA UNIV NEW YORK

(U) Size, Shape and Site Selectivities in the Photochemical Reactions of Molecules Adsorbed on Pentasil Zeolites.

88 12P

PERSONAL AUTHORS: Abrams, Lloyd; Corbin, David R.; Turro, Nicholas J.

CONTRACT NO. AFOSR-88-0043

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0728

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Characterization of Porous Solids, p519-529 1988.

ABSTRACT: (U) The photochemistry of dibenzyl ketones in the presence of pentasil zeolites follows strikingly different pathways depending on the location of the absorbed ketone. The product distribution or Cage Effect (vide infra) demonstrates the effects of sorption and diffusion on the radical species produced by photolysis. The difference in chemistry of these zeolites, expressed as the Si/Al ratio, does not affect the product distribution. By addition of a non-reactive titrant, such as water, after the ketone adsorption into the zeolite, the photolysis product distributions can be systematically varied depending upon the aluminum content of the framework. These results are completely described by considerations of (a) the size and shape sorption selectivity of the pentasil zeolites, (b) sorption of water by the hydrophilic sites of the pentasil zeolites (which depends upon the framework aluminum content), and (c) the hydrophobic characteristics of the pentasil channels which do not contain framework aluminum. Keywords: Zeolites, Photochemistry, Adsorption, Pentasil. (jes)

DESCRIPTORS: (U) *ADSORPTION, *PHOTOCHEMICAL REACTIONS,

AD-A197 759

AD-A197 758

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PAGE 2 3 EVJ00F

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AD-A197 758 CONTINUED DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 758 CONTINUED

AD-A197 752 20/12

ALUMINUM, BENZYL RADICALS, HYDROPHILIA, HYDROPHOBIC PROPERTIES, KETONES, PHOTOLYSIS, SITES, SORPTION, WATER.

ILLINOIS UNIV AT CHICAGO CIRCLE

IDENTIFIERS: (U) WUAFOSR230382, PE81102F, Pentasil zeolites.

(U) MBE Growth, Characterization and Electronic Device Processing of HgCdTe, HgZnTe, Related Heterojunctions and HgCdTe-CdTe Superlattices.

DESCRIPTIVE NOTE: Annual rept.,

DEC 87 42P

PERSONAL AUTHORS: Faurie, Jean-Pierre

CONTRACT NO. F49620-87-C-0021

MONITOR: AFOSR
TR-88-0723

UNCLASSIFIED REPORT

ABSTRACT: (U) A report is made on growth and characterization of high quality HgCdTe epilayers, MBE growth and characterization of two-inch diameter p- and n-type Hg(1-x)Cd(x)Te films on GaAs(100) substrate. The n-type intrinsic and extrinsic doping is discussed. The incorporation of As has been photo assisted using a Nd-YAG pulsed laser. X-ray photoemission of Hg clusters on Hg(1-x)Cd(x)Te surfaces has been studied. Direct measurement by XPS and electrical determination of HgTe-CdTe valence band discontinuity give values of 300-400 meV at 300K. Silicon has been used as a n-type dopant to grow a homojunction which electrical characteristics are presented here. Keywords: X ray photo emission spectroscopy; Mercury cadmium telluride; Gallium arsenide; Molecular beam epitaxial growth. (jd/rn)

DESCRIPTORS: (U) *CADMIUM TELLURIDES, *EPIITAXIAL GROWTH, *GALLIUM ARSENIDES, *MERCURY COMPOUNDS, DETERMINATION, DOPING, ELECTRICAL PROPERTIES, ELECTRONIC EQUIPMENT, MEASUREMENT, MOLECULAR BEAMS, N TYPE SEMICONDUCTORS, NEODYMIUM LASERS, PHOTOELECTRIC EMISSION, PROCESSING, PULSED LASERS, SILICON, X RAYS, VAG LASERS.

IDENTIFIERS: (U) PE81102F.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 748

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AD-A197 722

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12/5

TEXAS A AND M UNIV COLLEGE STATION

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL
ENGINEERING AND COMPUTE R SCIENCES(U) Optimal Rates of Convergence for Deconvolving a
Density.(U) Hybrid (Optical/Electronic) Computing and Digital
Computing.

DESCRIPTIVE NOTE: Rept. Aug 87-Aug 88,

88, DESCRIPTIVE NOTE: Annual technical rept. 1 Mar 87-29 Feb
88,

AUG 88

8P

PERSONAL AUTHORS: Carroll, Raymond J.; Hall, Peter

JUN 88

37P

REPORT NO. TR-3

PERSONAL AUTHORS: Lee, Sing H.

CONTRACT NO. F49620-85-C-0144

CONTRACT NO. AFOSR-85-0371

PROJECT NO. 2304

PROJECT NO. 2305

TASK NO. A6

TASK NO. B1

MONITOR: AFOSR

MONITOR: AFOSR

TR-88-0775

TR-88-0739

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Suppose we observe the sum of two independent random variables X and Z , where Z denotes measurement error and has a known distribution, and where the unknown density f of X is to be estimated. It is shown that if Z is normally distributed and if f has k bounded derivatives, then the fastest attainable convergence rate of any nonparametric estimator of f is only $(\log n)^{-k/1}$. Therefore deconvolution with normal errors may not be a practical proposition. Other error distributions are also treated. Stefanski-Carroll (1978b) estimators achieve the optimal rates. Our results have versions for multiplicative errors, where they imply that even optimal rates are exceptionally slow. Keywords: Deconvolution, Density estimation, Errors variables, Measurement error, Rates Convergence. (MUM)

ABSTRACT: (U) The program consists of two areas of optical information processing: (i) optical-analog/electronic hybrid computing for optical image processing, optical pattern recognition and solution of partial differential equations, and (ii) nonlinear optical devices and digital optical computing. The optical-analog/electronic digital hybrid system consist of an analog optical processor with input/output interfaces to a microcomputer. The analog optical processor is employed to perform time consuming computations, while the logical decisions and controls are provided by an electronic microcomputer. For image processing we have implemented, with hybrid systems, numerous space-variant transformations (e.g., Hough transform for detection of high-order parametric curves, coordinate transform for rotation and scale invariant feature extraction, etc.). (Jhd)

DESCRIPTORS: (U) *CONVERGENCE, DENSITY, DISTRIBUTION, ERRORS, ESTIMATES, MEASUREMENT, MULTIPLICATION FACTOR, OPTIMIZATION, RATES, VARIABLES.

DESCRIPTORS: (U) *ELECTRONICS, *IMAGE PROCESSING, *OPTICAL PROCESSING, *HYBRID COMPUTERS, ANALOG SYSTEMS, COMPUTATIONS, CURVES(GEOMETRY), DETECTION, DIGITAL COMPUTERS, HYBRID SYSTEMS, INPUT OUTPUT PROCESSING, INTERFACES, INVARIANCE, MICROCOMPUTERS, NONLINEAR SYSTEMS, OPTICAL DATA, OPTICAL EQUIPMENT, OPTICAL IMAGES, OPTICS,

IDENTIFIERS: (U) WJAFOSR2304A6, PE81102F.

AD-A197 748

AD-A197 722

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A197 722 CONTINUED

PARAMETRIC ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS,
PATTERN RECOGNITION, SCALE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1, Hough
transforms, Feature extraction.

AD-A197 717 7/4 20/5

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB
OF CHEMICAL PHYSICS

(U) Femtosecond Real-Time Observation of Wave Packet
Oscillations (Resonance) in Dissociation Reactions.

MAY 88 4P

PERSONAL AUTHORS: Rose, Todd S.; Kosker, Mark J.; Zewail,
Ahmed H.

CONTRACT NO. AFOSR-87-0071

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0730

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v88
n10 p6672-6673, 15 May 88.

ABSTRACT: (U) This reprint reports the real-time
observation of strong wave packet oscillations (resonance)
in a dissociation reaction. A strong resonance in the
reaction of NaI, and a much weaker resonance in the
reaction of NaBr, were seen. These observations were made
by exciting the salt to the covalent state(s) along the M-
X coordinate using a femtosecond pump pulse. A fs probe
pulse was used at different delay times and wavelengths
(t and lambda spectra) to detect the free product (on
resonance with Na D lines at 589 nm) or perturbed Na (off-
resonance) atoms. As discussed later, these results are,
in general, consistent with the spectroscopy. Keywords:
Sodium iodide, Sodium bromide, Chemical dissociation,
Reprints. (jhd)

DESCRIPTORS: (U) *CHEMICAL DISSOCIATION, *RESONANCE
RADIATION, ATOMS, BROMIDES, COORDINATES, COVALENT BONDS,
DELAY, IODIDES, OBSERVATION, OSCILLATION, PROBES, PULSES,
PUMPS, REAL TIME, REPRINTS, RESPONSE, SODIUM COMPOUNDS,
SPECTROSCOPY, TIME, WAVE PACKETS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Resonance
spectroscopy, Femtosecond time, Sodium iodide, Sodium

AD-A197 722

AD-A197 717

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 717 CONTINUED
bromide.

AD-A197 715 7/4

CINCINNATI UNIV OH DEPT OF CHEMISTRY

- (U) Characterization of Hydroquinone and Related Compounds Adsorbed at Pt(111) from Aqueous Solutions: Electron Energy-Loss Spectroscopy, Auger Spectroscopy, Low Energy Electron Diffraction, and Cyclic Voltammetry.

88 11P

PERSONAL AUTHORS: Lu, Frank; Salaita, Ghaleb N.; Laguren-Davidson, Laarni; Stern, Donald A.; Weliner, Edna

CONTRACT NO. AFOSR-88-0200

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-88-0709

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Langmuir, v4 n3 p837-848 1988.

ABSTRACT: (U) Adsorption of hydroquinone and a series of related compounds from aqueous solutions at well-defined platinum (111) single-crystal surfaces has been studied: hydroquinone (HQ), benzoquinone (BQ), phenol (PL), perdeuteriophenol (PDPL), phenol- d_6 , tetrafluorohydroquinone (TFHQ), and 2, 5-dihydroxy-4-methylbenzyl mercaptan (DMBM). Packing densities (moles adsorbed per unit area) were measured for each compound by quantitative Auger electron spectroscopy. Packing densities of HQ, BQ, PL, PDPL, and TFHQ adsorbed from millimolar solutions indicated adsorption with the ring parallel to the Pt(111) surface; in contrast, DMBM was adsorbed with the ring pendant from the surface. Vibrational spectra of the adsorbed layers formed from these compounds were obtained by electron energy-loss spectroscopy (EELS) and were compared with the infrared spectra of the parent compounds in Potassium Bromide. The EELS and IR spectra were closely similar except that the phenolic hydrogens of HQ, PL, PDPL, and TFHQ are removed during adsorption. EELS bands of polar groups such as OH are not broadened to the same extent as in the IR spectra of the solid compounds, evidently due to less intermolecular bonding among such groups at the surface.

AD-A197 717

AD-A197 715

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A197 715 CONTINUED

AD-A197 714 6/1

Electrocatalytic oxidation; Packing density;
Electrochemistry. Reprints. (aw)

DESCRIPTORS: (U) *QUINONES, *THIOLS, AUGER ELECTRON
SPECTROSCOPY, BANDS (STRIPS), BROMIDES, ELECTROCATALYSTS,
ELECTROCHEMISTRY, ELECTRON DIFFRACTION, ELECTRON ENERGY,
ELECTRON SPECTROSCOPY, HYDROGEN, INFRARED SPECTRA, LAYERS,
LOSSES, LOW ENERGY, MOLECULE MOLECULE INTERACTIONS,
OXIDATION, PACKING DENSITY, PLATINUM, POTASSIUM COMPOUNDS,
MOLECULAR ASSOCIATION, REPRINTS, SINGLE CRYSTALS, SOLIDS,
SOLUTIONS (MIXTURES), SURFACES, VIBRATIONAL SPECTRA,
VOLTAMMETRY, WATER.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2303A1, *Hydroquinones,
Mercaptan/2-5- Dihydroxy-4-Methylbenzel-Benzoquinone,
Perdueteriophenol, Hydroquinone/Tetrafluoro, Electron
energy loss spectroscopy.

HANNEMANN UNIV SCHOOL OF MEDICINE PHILADELPHIA PA

(U) Electrophysiological Actions of Norepinephrine in Rat
Lateral Hypothalamus. 2. An In Vitro Study of the
Effects of Ionophoretically Applied Norepinephrine on
LH Neuronal Responses to Gamma-Aminobutyric Acid (GABA)

DESCRIPTIVE NOTE: Rept. for 1 Feb 87-31 Mar 88.

88 18P

CONTRACT NO. AFOSR-85-0155, SAFOSR-87-0138

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-0718

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Brain Research v446 p90-105
1988.

ABSTRACT: (U) Many previous studies have demonstrated
modulatory effects of norepinephrine (NE) on neuronal
responsiveness in local circuits of mammalian brain
including the cerebellum, cerebral cortex, hippocampus,
lateral geniculate nucleus and facial motor nucleus. In
the preceding paper, we reported that iontophoretically
applied NE could consistently augment synaptically
induced (89%) inhibitory responses of lateral
hypothalamic (LH) neurons recorded in vivo. In the
present experiments, we studied the effects of NE and
other sympathomimetic drugs on LH neuronal responses to
direct iontophoretic application of GABA in the
hypothalamic tissue slice preparation. The objectives of
the study were two-fold: (1) to validate the slice
preparation as a model for further in vitro study of NE
modulatory phenomena, and (2) to characterize NE-
facilitating effects on GABA inhibition in terms of alpha
and beta-adrenoceptor mechanisms. The results indicate
that augmentation of GABA-depressant responses by NE car-
noradrenergic activation and the cyclic adenosine

AD-A197 714

AD-A197 715

UNCLASSIFIED

PAGE 274

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 714 CONTINUED

AD-A197 700 20/7 9/3

monophosphate (AMP) second messenger system. However, in contrast to the results obtained in vivo, NE exerted an alpha-like antagonistic effect on GABA-mediated inhibition in a high percentage of LH neurons, suggesting that under tissue slice conditions a major shift from beta-to-alpha type responsiveness of LH neurons may occur. A preliminary report of this work has appeared previously. Reprints. (kt)

DESCRIPTORS: (U) *ELECTROPHYSIOLOGY, *LEVARTERENOL, ADENOSINE PHOSPHATES, AMINO ACIDS, BRAIN, BUTYRIC ACIDS, CEREBELLUM, CEREBRAL CORTEX, HYPOTHALAMUS, PHYSIOLOGICAL EFFECTS, CYCLIC COMPOUNDS, DRUGS, HIPPOCAMPUS, IN VITRO ANALYSIS, IN VIVO ANALYSIS, INHIBITION, MAMMALS, NERVE CELLS, REPRINTS, RESPONSE(BIOLOGY).

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2, Norepinephrine, Lateral geniculate.

TEXAS ENGINEERING EXPERIMENT STATION COLLEGE STATION

(U) Investigation of Acceleration and Densification of Electrons Utilizing Travelling Magnetic Waves.

DESCRIPTIVE NOTE: Final rept. 30 Sep 83-31 Oct 87,

APR 88 20P

PERSONAL AUTHORS: Chen, K. W.; Kim, S. H.

CONTRACT NO. AFOSR-83-0388

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-88-0708

UNCLASSIFIED REPORT

ABSTRACT: (U) Experimental investigation of electron beam physics: naturally occurring and externally driven low frequency (6-500 KHz) diocotron oscillations are observed and the $m = 1$ rotating structure of these oscillations are measured by using electrostatic probes. Systematic analysis of the circuit system for the generation of a fast-rising pinching magnetic field: a circuit consisted of distributed circuit (transmission line) part and lumped circuit parts included a coil are systematically analyzed from the first principles of circuit. Computer code to calculate expediently the temporal profile of the pinching magnetic is developed. Theoretical study of acceleration of high-energy electron beams by a laser-light through net inverse bremsstrahlung in plasma fields: the absorption of the incident laser photons by net inverse bremsstrahlung can give rise to the dc ponderomotive force whose strength is far greater than the amplitude of the Lorentz force of the laser wave. Study of a soft x-ray free electron laser (FEL) scheme using a two-beam elliptical pill-box wake-field cavity: it is found that the scheme provides sufficient gain as a coherent radiation source down to the x-ray regime. Wake field acceleration research: the theoretical result from the modal analysis developed here agrees with the recent experiment in both profile (shape) and magnitude of the wake potential. Development of a laser photocathode for

AD-A197 714

AD-A197 700

UNCLASSIFIED

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EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A197 700 CONTINUED

the generation of high-current short-length electron bunch, and design and construction of a modified betatron: a modified betatron called the UTA Modified Betatron was constructed. (Jhd)

DESCRIPTORS: (U) *BREMSSTRAHLUNG, *FREE ELECTRON LASERS, *MAGNETIC FIELDS, *BETATONS, *TRAVELING WAVES, ABSORPTION, ACCELERATION, CIRCUITS, COHERENT RADIATION, COMPUTER PROGRAMS, DISTRIBUTION, ELECTRON BEAMS, ELECTRON ENERGY, ELECTROSTATIC PROBES, FLOW FIELDS, HIGH ENERGY, INVERSION, LORENTZ FORCE, LOW FREQUENCY, OSCILLATION, PHOTOCATHODES, PHOTONS, PLASMAS(PHYSICS), SOURCES, ELECTRON DENSITY, TRANSMISSION LINES, WAKE, WAVES, X RAYS, LASER COMPONENTS.

IDENTIFIERS: (U) PE01102F, Electron acceleration.

AD-A197 686 20/3

TEXAS UNIV AT AUSTIN DEPT OF PHYSICS

(U) Tunneling Microscopy of Superconductors and Tunneling Barriers.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 87-31 May 88.

MAY 88 11P

PERSONAL AUTHORS: De Lozanne, Alex

CONTRACT NO. AFOSR-87-0228

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR
TR-88-0705

UNCLASSIFIED REPORT

ABSTRACT: (U) Thin films of high temperature superconductors were made by sputtering and by co-evaporation. The former method produced thin films of YBaCuO which were completely superconducting at 82 K with 8 K transition widths. A new method was developed at the University of Texas which produced films of YBaCuO on strontium titanate that were superconducting at 84 K. This method minimizes the process temperature and produces films which are superconducting without the need for annealing. The films were also grown on silicon and sapphire substrates with zero resistance of 88 K or better. A low temperature scanning tunneling microscope was used to study the superconducting properties of these and other samples. High quality spectroscopic data was obtained which yields a value of approximately 11 for the ratio of the superconducting gap to the transition temperature. Keywords: High temperature superconductivity; Thin films; Tunneling.

DESCRIPTORS: (U) *SAPPHIRE, *SILICON, *SUBSTRATES, *SUPERCONDUCTIVITY, *SUPERCONDUCTORS, *THIN FILMS, ANNEALING, BARRIERS, HIGH TEMPERATURE, MICROSCOPY, RATIOS, SPECTROSCOPY, SPUTTERING, STRONTIUM, TITANATES, TRANSITION TEMPERATURE, TUNNELING, YTTRIUM, BARIUM COMPOUNDS, COPPER, OXIDES.

AD-A197 700

AD-A197 686

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A197 870 5/8

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF PHYSIOLOGY

(U) Preattentive and Attentive Visual Information Processing.

DESCRIPTIVE NOTE: Interim rept. 1 Apr 87-31 Mar 88.

JUN 88 82P

PERSONAL AUTHORS: Egeth, Howard E.

CONTRACT NO. AFOSR-87-0180

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-88-0726

UNCLASSIFIED REPORT

ABSTRACT: (U) Twelve (12) experiments are described in this report. The first nine (9) are concerned with the hypothesis that the identification of the values of stimulus features in multielement visual displays requires serial processing. Contrary to this hypothesis, the weight of the evidence suggests that feature identification can be carried out by spatially parallel processes. The remaining three (3) experiments are concerned with the ability to extract semantic information from several stimuli in parallel. Both alphanumeric character classification and lexical (i.e., word vs. nonword) decisions can be accomplished by parallel processes, but semantic categorization of words cannot. The implications of these findings for theories of attention are discussed. Keywords: Attention, Lexical access, Perception, Semantic processing, Subsidizing, Texture perception, Vision, Visual search. (sdv)

DESCRIPTORS: (U) *ATTENTION, *DISPLAY SYSTEMS, *VISUAL AIDS, *INFORMATION PROCESSING, ACCESS, ALPHANUMERIC DATA, CLASSIFICATION, HYPOTHESES, LEXICOGRAPHY, PARALLEL PROCESSING, PERCEPTION, PROCESSING, SEARCHING, SEMANTICS, STIMULI, TEXTURE, THEORY, VISION, VISUAL PERCEPTION.

IDENTIFIERS: (U) PE61102F, WJAFOSR2313A4.

AD-A197 870

UNCLASSIFIED

AD-A197 868 12/8 20/8

HONEYWELL INC BLOOMINGTON MN SENSORS AND SIGNAL PROCESSING LAB

(U) Optical Symbolic Processor for Expert System Execution.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 87-31 May 88.

MAY 88 102P

PERSONAL AUTHORS: Guha, Aloke; Bristow, Julian; Natarajan, Subra

CONTRACT NO. F49620-88-C-0082, \$\$ARPA Order-5794

MONITOR: AFOSR
TR-88-0735

UNCLASSIFIED REPORT

ABSTRACT: (U) A detailed performance evaluation was begun for our optical architecture, SPARO, for combinator graph reduction. Since the interconnection network was the bottleneck in the performance of the architecture, the focus was on the message throughput of the simple register-based network. An accurate performance model was derived for the equivalent bidirectional ring network and found, both by analysis and simulation, that the net parallelism in the architecture was restricted by the low message traffic in the network. When messages exhibited no locality, the throughput for a 1024 processor network was limited to 8. With local messages, the maximum throughput for the same network was 27. Keywords: Computer architecture; Optical computing; Symbolic programming. (jd/rh)

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *OPTICAL PROCESSING, *SYMBOLS, ARCHITECTURE, COMMUNICATIONS TRAFFIC, COMPUTATIONS, GRAPHS, MESSAGE PROCESSING, NETWORK FLOWS, NETWORKS, OPTICAL PROPERTIES, PERFORMANCE TESTS, REDUCTION, RINGS, SIMULATION, SYMBOLIC PROGRAMMING, THROUGHPUT.

IDENTIFIERS: (U) PE61102F.

AD-A197 868

PAGE 27 EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A197 881 12/3

AD-A197 856 7/3 7/8

TEXAS A AND M UNIV COLLEGE STATION DEPT OF STATISTICS

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Covariance Analysis in Generalized Linear Measurement Error Models.

(U) Synthesis and Chemistry of Novel Polynitropolycyclic Cage Molecules.

DESCRIPTIVE NOTE: Technical rept. no. 12, Aug 87-Aug 88,

88 20P

AUG 88 38P

PERSONAL AUTHORS: Marchand, Alan P.

PERSONAL AUTHORS: Carroll, Raymond J.

CONTRACT NO. AFOSR-84-0085

CONTRACT NO. F49620-85-C-0146

PROJECT NO. 2303

PROJECT NO. 2304

TASK NO. B2

TASK NO. A6

MONITOR: AFOSR

MONITOR: AFOSR
TR-88-0776

TR-88-0729

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This summarizes some of the recent work on the errors-in-variables problem in generalized linear models. The focus is on covariance analysis, and in particular testing for and estimation of treatment effects. There is a considerable difference between the randomized and nonrandomized models when testing for an effect. For estimation, one is largely reduced to using an errors in variables analysis. Some of the possible methods are outlined and compared. Keywords: Simple regression models. (KR)

DESCRIPTORS: (U) *COVARIANCE, *MATHEMATICAL MODELS, ERRORS, ESTIMATES, LINEARITY, MEASUREMENT, REGRESSION ANALYSIS, VARIABLES.

IDENTIFIERS: (U) PE811025, MUAFOSR2304A6

SUPPLEMENTARY NOTE: Pub. in Tetrahedron, v44 n9 p2377-2395 1988.

ABSTRACT: (U) The synthesis and chemistry of novel, strained, saturated polycarbocyclic cage molecules has proved to be a source of fascination for organic chemists. Cage hydrocarbons possess rigid, highly compact structures; such molecules frequently display unusual symmetry properties that render them aesthetically pleasing. Concomitant with their compact nature, carbon-carbon bond angles and bond lengths in carbocyclic cage molecules frequently deviate markedly from the normal values associated with sp³ hybridized carbon atoms. When this occurs, such deviations provide a measure of strain energy that is contained within the cage system. Steric strain can also express itself in a cage system through, e.g., increased negative heat of combustion and increased positive heat of formation relative to that of a corresponding unstrained system. The incorporation of high levels of molecular strain into cage systems confers upon them corresponding levels of thermodynamic instability. Thus, organic chemists who are attracted by the challenge inherent in the synthesis of such highly strained molecules must seek ways to circumvent or otherwise mitigate the deleterious effects of strain in these systems. Partly in response to this need, an important area of organic chemistry, referred to as the synthesis of non-natural products, has emerged and has

AD-A197 881

AD-A197 856

UNCLASSIFIED

PAGE 278

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 656 CONTINUED

resulted in the synthesis and study of a large number of novel, highly strained cage molecules. Keywords: Adamantanes; Undecanediones; Cubanes; Dodecanes; Dodecanes. Reprints. (aw)

DESCRIPTORS: (U) *POLYCYCLIC COMPOUNDS, *NITRO RADICALS, *HYDROCARBONS, ADAMANTANES, ANGLES, HEAT OF COMBUSTION, HEAT OF FORMATION, LENGTH, MOLECULES, ORGANIC CHEMISTRY, REPRINTS, STABILITY, SYMMETRY, SYNTHESIS(CHEMISTRY), THERMODYNAMICS, MOLECULAR STRUCTURE.

IDENTIFIERS: (U) *Polynitropolycyclic compounds, *Cage molecules, Undecanediones, Cubanes, Undecanes, Dodecanes, Cage compounds.

AD-A197 640 9/1 20/12

CORNELL UNIV ITHACA NY SCHOOL OF ELECTRICAL ENGINEERING
(U) Compound Semiconductor Materials, Devices and Circuits.

DESCRIPTIVE NOTE: Annual rept. 1 May 87-30 Apr 88,

JUN 88 62P

PERSONAL AUTHORS: Shealy, J. R.; Eastman, L. F.; Wolf, E. D.; Tasker, P. J.; Krusius, J. P.

CONTRACT NO. F49820-87-C-0044

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR
TR-88-0738

UNCLASSIFIED REPORT

ABSTRACT: (U) This one year research program on compound semiconductor materials growth, devices and circuits has focused on: (a) organometallic vapor phase epitaxy (OMVPE) of GaInP/GaAs and AlInP/GaInP superlattices; (b) enhancement of heterostructure device speed performance via strain layer superlattices and mushroom gates in modulation doped FET's (MODFET's), and inserted tunnel barriers heterojunction bipolar devices (HBT); (c) fabrication and characterization of MODFET devices with gate lengths to 50 nm; (d) self-consistent Monte Carlo transport formulation and its application to small graded heterostructure devices; (e) optical modulation based on the quantum confined Stark effect; and (f) femtosecond spectroscopy of hot carrier processes using the visible Rh6G laser and a new UV BaB204 laser. Keywords: Gallium indium phosphide; Gallium arsenide; Aluminum indium phosphide; Field effect transistors; Barium borate. (jd/rh)

DESCRIPTORS: (U) *EPIAXIAL GROWTH, *FIELD EFFECT TRANSISTORS, *GALLIUM ARSENIDES, *GALLIUM PHOSPHIDES, *INDIUM PHOSPHIDES, *ORGANOMETALLIC COMPOUNDS, *SEMICONDUCTORS, *STARK EFFECT, ALUMINUM COMPOUNDS, BARIUM, BORATES, CHARGE CARRIERS, HIGH ENERGY, MATERIALS, MODULATION, OPTICAL PROPERTIES, QUANTUM THEORY, SPECTROSCOPY, STARK EFFECT, VAPOR PHASES, ALUMINUM,

AD-A197 656

AD-A197 640

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 840 CONTINUED

BARIUM, BORATES, CHARGE CARRIERS, CONFINEMENT(GENERAL), EPITAXIAL GROWTH, FIELD EFFECT TRANSISTORS, GALLIUM ARSENIDES, GALLIUM PHOSPHIDES, GROWTH(GENERAL), HIGH ENERGY, INDIUM PHOSPHIDES, MATERIALS, MODULATION, OPTICAL PROPERTIES, ORGANOMETALLIC COMPOUNDS, QUANTUM THEORY, SEMICONDUCTORS, SPECTROSCOPY, VAPOR PHASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305A9, Superlattices. Barium borates, Femtosecond time, Femtosecond spectroscopy, Aluminum indium phosphides.

AD-A197 810 20/5 14/2 20/8

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Purchase of a Nuclear Magnetic Resonance Spectrometer.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-1 Aug 88.

AUG 88 5P

PERSONAL AUTHORS: Boudjouk, Philip

CONTRACT NO. AFOSR-87-0038

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR
TR-88-0893

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the final results of the purchase, acquisition and installation of a JEOL Model GSX Superconducting Multinuclear Spectrometer. Keywords: Multinuclear spectrometer; Superconducting; Magnetic resonance; Broadband; Nuclear magnetic resonance spectroscopy. (jhd)

DESCRIPTORS: (U) *NUCLEAR MAGNETIC RESONANCE, *NUCLEAR RADIATION SPECTROMETERS, ACQUISITION, MAGNETIC RESONANCE, NUCLEAR RADIATION SPECTROSCOPY, LABORATORY EQUIPMENT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A2.

AD-A197 840

AD-A197 810

UNCLASSIFIED

PAGE 260

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 808 CONTINUED

inverse, Linear transformations.

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Linear Transformations, Projection Operators and Generalized Inverses; A Geometric Approach.

DESCRIPTIVE NOTE: Technical rept..

MAR 88 22P

PERSONAL AUTHORS: Rao, C. R.

REPORT NO. TR-88-04

CONTRACT NO. AFOSR-88-0030

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-88-0788

UNCLASSIFIED REPORT

ABSTRACT: (U) A generalized inverse of a linear transformation $A: V \rightarrow W$, where V and W are finite dimensional vector spaces, is defined using geometric concepts of linear transformations and projection operators. The inverse is uniquely defined in terms of specified subspaces M is a subset of V , N is a subset of W and a linear transformation N such that $AN = 0$, $NA = 0$. Such an inverse which is unique is called the l_{MN} -inverse. A Moore-Penrose type inverse is obtained by putting $N=0$. Applications to optimization problems when V and W are inner product spaces, such as least squares in a general setting, are discussed. The results given in the paper can be extended without any major modification of proofs to bounded linear operators with closed range on Hilbert spaces. Keywords: G inverse; Linear transformation; Moore Penrose inverse; Projection operator. (Jnd)

DESCRIPTORS: (U) *PROJECTIVE GEOMETRY, *TRANSFORMATIONS(MATHEMATICS), *VECTOR SPACES, HILBERT SPACE, LEAST SQUARES METHOD, LINEAR SYSTEMS, LINEARITY, OPERATORS(MATHEMATICS), OPTIMIZATION, SIZES(DIMENSIONS), YIELD.

IDENTIFIERS: (U) PEB1102F, MUAFOSR2304A8, Moore Penrose

AD-A197 808

AD-A197 808

UNCLASSIFIED

PAG 2 FVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 605 11/8.1

AD-A197 605 CONTINUED

ADVANCED COMMUNICATIONS ENGINEERING CO ALYAMONTE SPRINGS
FL

IDENTIFIERS: (U) PEB1102F, WUAFOSR2308A1

(U) Fundamental Understanding of the Intrinsic Ductility
in Nickel-Base L1 sub 2 Type Alloys.

DESCRIPTIVE NOTE: Final rept. 15 Feb 88-14 Feb 88,

JUN 88 84P

PERSONAL AUTHORS: Lav, C. G.; Shah, D. W.; Lin, J.

REPORT NO. PWA-FR-20424

CONTRACT NO. F49620-86-C-0033

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-88-0771

UNCLASSIFIED REPORT

ABSTRACT: (U) A basic approach for understanding the ductility behavior of intermetallics through studies of mechanical properties and dislocation characteristics of single crystals was applied to a nickel-base L12 phase compound. Large single crystals of binary and tantalum-modified Ni3Al alloys with various stoichiometry were produced for tensile testing at 293 to 1144K along four major orientations: (001), (011), (111) and (123). For the binary alloys the tensile ductility generally decreases with temperature for all orientations and reaches a minimum at about 1000K for the nickel-rich (hypostoichiometric) alloy A1240. For a given temperature the ductility decreases in the order (110), (123), (001) and (111) in A1240. The ductility of the stoichiometric and hypostoichiometric binary alloys is lower and shows a more complex temperature and orientation dependence than A1240. Keywords: Nickel aluminate, Single crystals, Ductility. (jes)

DESCRIPTORS: (U) *BINARY ALLOYS, *NICKEL, ALUMINIDES, DISLOCATIONS, DUCTILITY, MECHANICAL PROPERTIES, ORIENTATION(DIRECTION), SINGLE CRYSTALS, STOICHIOMETRY, TEMPERATURE, TENSILE PROPERTIES, TENSILE TESTERS.

AD-A197 605

AD-A197 605

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A197 801

7/4

AD-A197 801 CONTINUED

OPTICAL SOCIETY OF AMERICA WASHINGTON D C

(U) Proceedings of the Topical Meeting on the Microphysics of Surfaces, Beams, and Adsorbates (2nd) Held in Sante Fe, New Mexico on 16-18 February 1987.

DESCRIPTIVE NOTE: Final rept. 1 Feb-31 Oct 87.

OCT 87 163P

PERSONAL AUTHORS: Quinn, Jarus W.; Mayer, T. M.; Ehrlich, D. J.; Chuang, T. J.

CONTRACT NO. AFOSR-87-0109

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-88-0385

UNCLASSIFIED REPORT

ABSTRACT: (U) Partial Contents: The reaction of Si(100) 2 x 1 with NO and NH3; The role of surface dangling bonds; Molecular dynamics simulation of low-energy beam deposition of silicon; Visible laser etching of refractory metals by surface modification; Modulated molecular beam studies of the surface chemistry of silicon reaction with reactive gases; Effects of Ar(+) angle of incidence on the etching of Si with Cl2 and low energy Ar(+) ions; Multiphoton induced desorption of positive ions from barium fluoride; Excited atom production by electron and ion bombardment of alkali halides; Selective area deposition of metals using low energy electron beams; Synchrotron radiation-excited chemical-vapor deposition and etching; Chemiluminescence from F and XeF2 etching reaction with silicon; An in situ infrared study on the interaction of oxygen plasmas with Si and fluorine plasmas with SiO2 surfaces; Ultraviolet-assisted growth of GaAs; Atomic layer growth of GaAs by modulated-continuous-wave laser metal-organic vapor phase epitaxy; Sum-frequency generation on dye-coated surfaces using collinear and noncollinear excitation geometries; Surface diffusion measured by laser-induced desorption; Monte Carlo simulation of effects of surface defects on diffusion; Ion and neutral atomic and cluster sputtering

AD-A197 801

AD-A197 801

UNCLASSIFIED

PAGE

21

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Yields of molybdenum; Molecular beam epitaxy growth mechanisms on GaAs (100) surfaces; A study of the mechanism of metal deposition by the laser induced forward transfer process. (Jhd)

DESCRIPTORS: (U) *ADSORBATES, *DIFFUSION, *MOLECULAR BEAMS, *SURFACE CHEMISTRY, ALKALI METAL COMPOUNDS, ATOMS, BARIUM HALIDES, CATIONS, CHEMILUMINESCENCE, DEFECTS(MATERIALS), DEPOSITION, DESORPTION, ADSORPTION, DYNAMICS, ELECTRON BEAMS, ELECTRON ENERGY, ELECTRONS, SYMPOSIA, ETCHING, EXCITATION, FLUORIDES, FLUORINE, HALIDES, INFRARED RADIATION, ION BOMBARDMENT, LASERS, LINEARITY, LOW ENERGY, EPITAXIAL GROWTH, METALS, MODIFICATION, MODULATION, MOLECULAR PROPERTIES, MOLYBDENUM, MONTE CARLO METHOD, OXYGEN, PHOTONS, SILICON, AMMONIA, PLASMAS(PHYSICS), PRODUCTION, REACTIVE GASES, GALLIUM ARSENIDES, REFRACTORY METALS, RESPONSE, SILICON, SIMULATION, VISIBLE SPECTRA, NITROGEN OXIDES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A2, Nitrogen monoxide, Xenon difluoride.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A197 561 12/8

COLORADO UNIV AT BOULDER DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Instrumentation Request for Optical Symbolic Computing.

DESCRIPTIVE NOTE: Final rept. 1 Nov 86-30 Apr 88.

JUL 88 4P

PERSONAL AUTHORS: Cathey, W. Y.; Johnson, Kristina W.

REPORT NO. 153-8773-2

CONTRACT NO. AFOSR-87-0060

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-88-0737

UNCLASSIFIED REPORT

ABSTRACT: (U) The equipment grant was combined with other funds to purchase image processing and simulation equipment. The central purchases were a sun microsystem and a recognition technologies image processing system. In addition to image processing, simulation of two-dimensional optical processing systems has been performed. (jd/rh)

DESCRIPTORS: (U) *IMAGE PROCESSING, *OPTICAL PROCESSING, *SYMBOLIC PROGRAMMING, COMPUTATIONS, MICROELECTRONICS, OPTICAL EQUIPMENT, PROCUREMENT, SIMULATION, SIMULATORS, SYMBOLS, TWO DIMENSIONAL.

IDENTIFIERS: (U) PE81102F WUAFOSR2917A3.

SEARCH CONTROL NO. EVJ00F

AD-A197 454 20/4 12/1

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MATHEMATICS

(U) Parallel Algorithms in the Finite Element Approximation of Flow Problems.

DESCRIPTIVE NOTE: Final rept. May 87-May 88.

MAY 88 20P

PERSONAL AUTHORS: Gumburger, Max D.

CONTRACT NO. AFOSR-83-0101

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-88-0784

UNCLASSIFIED REPORT

ABSTRACT: (U) We discuss a portion of the research of the which has been carried out during the past years under AFOSR sponsorship. This includes work on finite element methods for a Ladyshenskaya model of viscous incompressible flow, hyperbolic partial differential equations, exterior problems, algebraic turbulence models, streamfunction vorticity formulations of viscous flows and first order elliptic systems of partial differential equations, and on substructuring methods for the approximate solution of partial differential equations. (MJM)

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *INCOMPRESSIBLE FLOW, *TURBULENCE, *VISCOUS FLOW, ALGEBRA, ALGORITHMS, ELLIPSES, EXTERNAL, FLOW, FORMULATIONS, HYPERBOLAS, MATHEMATICAL MODELS, PARALLEL PROCESSING, PARTIAL DIFFERENTIAL EQUATIONS, VORTICES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A4

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 453 7/4

AD-A197 453 CONTINUED

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Electrochemistry at Well-Characterized Surfaces.
88 25P

IDENTIFIERS: (U) PE81102F, WUAFOSR2301A1

PERSONAL AUTHORS: Hubbard, Arthur T.

CONTRACT NO. AFOSR-88-0200

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-88-0704

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Review, v88 n4 p833-856 1988.

ABSTRACT: (U) The objective of this review is to illustrate by examples from the literature the strengths and limitations of surface electrochemistry done with the multitechnique approach characteristic of investigations involving well-defined surfaces. Only studies at surfaces characterized as to structure and composition or directly traceable to such surfaces are included. Arrangement of the subject matter follows the order in which the mysteries were deciphered, each subsequent result depending for its interpretation on the realizations that preceded it. For this reason the adsorption of electrolytes (including solvents) is considered first, followed by electrodeposition of metals, passivation of surfaces by oxide layers, adsorption of molecules and molecular fragments, and finally the few electrode reactions of well-characterized adsorbed molecules thus far studied. Keywords: Ionic solutions; Low energy electron diffraction; Platinum; Halides; Cyanides; Thiocyanates; Corrosion. Reprints. (aw)

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *SURFACE CHEMISTRY, ADSORPTION, CORROSION, CYANIDES, ELECTRODEPOSITION, ELECTRODES, ELECTROLYTES, ELECTRON DIFFRACTION, FRAGMENTS, HALIDES, IONIZATION, LAYERS, LOW ENERGY, METALS, MOLECULES, OXIDES, PASSIVITY, PLATINUM, REPRINTS, SOLVENTS, SURFACES, THIOCYANATES.

AD-A197 453

AD-A197 453

UNCLASSIFIED

PAGE 2 - FM-100F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 323 12/3

AD-A197 300 21/2

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

M L ENERGIA INC PRINCETON NJ

(U) Identifying Nonlinear Covariate Effects in Semimartingale Regression Models.

(U) Radiative Augmented Combustion.

DESCRIPTIVE NOTE: Technical rept..

DESCRIPTIVE NOTE: Final technical rept. 15 Jul 83-31 May 87,

JUN 88 23P

MAR 88 34P

PERSONAL AUTHORS: McKeague, Ian W.; Utikal, Klaus J.

PERSONAL AUTHORS: Lavid, Moshe

REPORT NO. FSU-TR-M783, YK-D103-ARO

CONTRACT NO. F49620-85-C-0145

CONTRACT NO. DAAL03-88-K-0084, SAFOSR-88-0040

PROJECT NO. 2308

MONITOR: ARO, AFOSR
23688.18-WA, TR-88-129

TASK NO. A2

MONITOR: AFOSR
TR-88-0494

UNCLASSIFIED REPORT

ABSTRACT: (U) Let X sub t be a semimartingale which is either continuous or of counting process type and which satisfies the stochastic differential equation dX sub t = Y sub t $\alpha(t, Z$ sub $t)$ $dt + dM$ sub t , where Y and Z are predictable covariate processes, M is a martingale and α is an unknown, nonrandom function. The authors study inference for α by introducing an estimator and deriving a functional central limit theorem for it. The asymptotic distribution turns out to be given by a Gaussian random field that admits a representation as a stochastic integral with respect to a multiparameter Wiener process. This result is used to develop a test for homogeneity of α , and a goodness-of-fit test for the proportional hazards model $\alpha(t, z) = \alpha_0(t) \exp(\beta' z)$ where α_0 sub $2(z)$ used in survival analysis. (KR)

DESCRIPTORS: (U) *COVARIANCE, *MATHEMATICAL MODELS, *REGRESSION ANALYSIS, ASYMPTOTIC SERIES, COUNTING METHODS, DIFFERENTIAL EQUATIONS, HAZARDS, LIMITATIONS, NONLINEAR SYSTEMS, STOCHASTIC PROCESSES, SURVIVAL(GENERAL), THEOREMS.

IDENTIFIERS: (U) Semimartingales.

AD-A197 323

AD-A197 300

UNCLASSIFIED

PAGE 286

EVJ00F

UNCLASSIFIED REPORT

ABSTRACT: (U) Many combustion applications are presently limited by constraints such as flammability, flame propagation, ignition and stability imposed by the combustion process itself. Consequently much attention is being given to techniques which can augment combustion by extending these limits. One such promising technique is Radiative Augmented Combustion. It is based on the fact that radiation of selected wavelengths is capable of photodissociating stable molecule, combustion intermediates and other inhibiting species into reactive radicals. Subsequent increases in concentration of these radicals can modify the overall kinetics and produce radiative ignition and combustion enhancements. The potential of this technique was previously demonstrated under static conditions. Radiative ignition, photochemical ignition, ignition energy, Combustion enhancement, Flameholding, Ignition delay time, Supersonic combustion, Flame speed, Radicals. (MUM)

DESCRIPTORS: (U) *COMBUSTION, *FLAMMABILITY, AUGMENTATION, CHEMICAL RADICALS, ENERGY, FLAME HOLDERS, FLAME PROPAGATION, FLAMES, IGNITION, IGNITION LAG, MOLECULES, OPTIMIZATION, PHOTOCHEMICAL REACTIONS, RADIATION, STABILITY, STATICS, SUPERSONIC COMBUSTION, VELOCITY.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 300 CONTINUED

AD-A197 253 7/2

IDENTIFIERS: (U) PE81102F, WJAFOSR2308A2.

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

- (U) Microstructure and Properties of Catalysts Symposium
Held in Boston, Massachusetts on November 30-December
3, 1987. Materials Research Society Symposium
Proceedings. Volume 111.

DESCRIPTIVE NOTE: Final rept..

87 484P

PERSONAL AUTHORS: Treacy, M. M.; Thomas, J. M.; White, J.
M.

CONTRACT NO. AFOSR-87-0345

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0610

UNCLASSIFIED REPORT

Availability: Materials Research Society, 9800 McKnight
Rd., Suite 327, Pittsburgh, PA 15237. MC \$48.00. No
copies furnished by DTIC/NTIS.

ABSTRACT: (U) This proceedings contains most of the
papers which were presented at the symposium on
'Microstructure and Properties of Catalysts' held in
Boston, Massachusetts, November 30 - December 3, 1987,
and sponsored by the Materials Research Society. The
symposium provided a forum for materials scientists,
synthesis chemists, physical chemists, chemical engineers,
physicists and theorists, to compare and discuss the
latest results which establish clear relationships
between structure and catalytic properties. Catalysts.
(mjm)

DESCRIPTORS: (U) *CATALYSTS, *CATALYTIC CRACKING,
*MICROSTRUCTURE, *SYMPOSIA, CHEMICALS, CHEMISTS,
ENGINEERS, MASSACHUSETTS, MATERIALS, PHYSICAL PROPERTIES,
PHYSICISTS, SCIENTISTS, SOCIETIES, SYNTHESIS(CHEMISTRY).

IDENTIFIERS: (U) WJAFOSR2303B2, PE81102F.

AD-A197 300

AD-A197 253

UNCLASSIFIED

PAGE 7

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 191 8/1 8/2

AD-A197 191 CONTINUED

BAYLOR COLL OF MEDICINE HOUSTON TX

(U) Cellular Mechanisms of Noradrenergic Enhancement of Long-Term Synaptic Potentiation in Hippocampus.

CYTOLOGY, DEPOLARIZATION, FREQUENCY, HIPPOCAMPUS, HYPOTHESES, INDUCTION SYSTEMS, ISOPROTERENOL, LEVARTERENOL, LONG RANGE(TIME), LOW FREQUENCY, MODULATION, PROBABILITY, RATS, RECORDING SYSTEMS, REPRINTS, STIMULATION(GENERAL).

88

14P

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2, *Norepinephrine.

PERSONAL AUTHORS: Johnston, Daniel; Hopkins, William F.; Gray, Richard

CONTRACT NO. AFOSR-85-0176

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-88-0804

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Neurophysiology, v59 p667-687 1988.

ABSTRACT: (U) We tested several hypotheses related to the modulation of long-term (LTP) by norepinephrine (NE) at the mossy fiber synapses in the rat hippocampal slice preparation using extracellular and intracellular recording techniques. NE exerted frequency-dependent effects on mossy fiber synaptic transmission. It had little effect on excitatory postsynaptic potentials sampled during low-frequency stimulation, whereas it had marked effects on the duration, magnitude, and probability of induction of LTP at these synapses. The Beta-adrenoceptor agonist isoproterenol and the adenylyate cyclase activator forskolin mimicked all of the effects of NE, whereas the Beta-adrenoceptor antagonists propranolol and timolol reversibly blocked the induction of LTP. The postsynaptic injection of 8-bromo-cyclic AMP overcame the block of LTP by propranolol, suggesting a postsynaptic locus of action for the NE-induced enhancement of LTP. NE may be acting postsynaptically to enhance the depolarization of the membrane potential during the high-frequency stimulus train used to induce LTP. Reprints. (kt)

DESCRIPTORS: (U) *POTENTIAL ENERGY, *MEMBRANES(BIOLOGY), *SYNAPSE, ACTIVATION, ADENYL CYCLASE, CELLS(BIOLOGY).

AD-A197 191

AD-A197 191

UNCLASSIFIED

PAGE 288

EVJ00F

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVJ00F

AD-A197 185 13/7 20/4

AD-A197 124 20/3

TEXAS A AND M UNIV COLLEGE STATION TURBOMACHINERY LABS

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) The Measurement and Prediction of Rotordynamic Forces for Labyrinth Seals.

(U) Coupled s-wave and d-wave States in the Heavy Fermion Superconductor U sub 1-x Th sub x Be sub 13.

DESCRIPTIVE NOTE: Final rept. 1 Sep 82-31 Dec 87,

DESCRIPTIVE NOTE: Technical rept.,

MAR 88 212P

JUN 88

PERSONAL AUTHORS: Childs, D. W.; Rhode, D. L.

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CONTRACT NO. F49620-82-K-0033

REPORT NO. UBUFFALO/DC-88/TR-74

PROJECT NO. 2302

CONTRACT NO. N00014-88-K-0043, F49620-88-C-0009

TASK NO. 81

MONITOR: AFOSR
TR-88-1248MONITOR: AFOSR
TR-88-0882

UNCLASSIFIED REPORT

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ABSTRACT: (U) Measurements of rotordynamic (stiffness and damping) coefficients and leakage characteristics were completed for labyrinth-rotor/honeycomb stator seals. Comparisons to labyrinth-rotor/smooth-stator seals showed no stability improvements. Tests were also carried out on smooth-rotor/honeycomb-stator seals and demonstrated superior stability and leakage performance for this type of seal if the entering flow is pre-rotated in the direction of rotation. A new 'bulk-flow' theory for labyrinth seals has been developed and its prediction compare well with measured results for tooth-on-rotor labyrinths. Also, a more sophisticated model was developed which solves the 3-D Reynolds-averaged Navier-Stokes equations for compressible flow. Keywords: Labyrinth seals, Rotordynamic forces, Turbine stators, Computational fluid dynamics. (jes)

DESCRIPTORS: (U) *FLUID DYNAMICS, *SEALS(STOPPERS), *TURBINE STATORS, COEFFICIENTS, COMPRESSIBLE FLOW, COMPUTATIONS, DAMPING, ROTATION, STABILITY, STIFFNESS.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2302B1, LABYRINTH SEALS, ROTORDYNAMIC FORCES.

AD-A197 185

UNCLASSIFIED

PAGE 11-6

EVJ00F

AD-A197 124

ABSTRACT: (U) In the heavy fermion superconductor U(1-x)Th(x)Be13, superconducting states coexist for thorium concentrations 0 < or = 0.08. Assuming s-wave and d-wave symmetries for these states, a Ginzburg-Landau free energy expression is derived which couples s- and d-wave states and is rotationally invariant, in contrast to the free energy expression proposed by Kumar and Wolfle (Phys. Rev. Lett. 59, 1954 (1987)). Discussed in detail are the consequences that follow from our free energy relation. In particular, one predicts that in the above system there are two eigenfrequencies associated with the dynamics of phase oscillations (internal Josephson effect) which are characteristic of the s-wave and d-wave states. Keywords: Coupled states; Heavy fermion system; Superconductor; Ginzburg Landau free energy. (JHD)

DESCRIPTORS: (U) *SUPERCONDUCTORS, DYNAMICS, FREE ENERGY, FREQUENCY, INTERNAL, JOSEPHSON JUNCTIONS, OSCILLATION, VIBRATION, FERMIONS, URANIUM ALLOYS, THORIUM ALLOYS, BERYLLIUM ALLOYS.

IDENTIFIERS: (U) Ginzburg Landau free energy.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F
AD-A197 119 20/6 CONTINUED

OPTICAL SOCIETY OF AMERICA WASHINGTON D C

(U) Topical Meeting on Optics in Adverse Environments:
Summaries of Papers Presented at the Optics in Adverse
Environments Topical Meeting Held in Albuquerque, New
Mexico on 11-12 February 1987. Technical Digest Series.
Volume 8.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Oct 87.

OCT 87 102P

PERSONAL AUTHORS: Quinn, James W.

CONTRACT NO. AFOSR-87-0084

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-88-0843

UNCLASSIFIED REPORT

ABSTRACT: (U) Environmental Impacts on the Hubble Space
Telescope; Ultralightweight Optics in a Cryogenic
Environment; Learjet Observatory Operations in The
Tropics; Advanced Optics Fabrication Trends; Materials
for Space Optics; Optics Fabrication Using Ion-Beam
Figuring; Optics for the Free Electron Laser; All-Metal
Resonator Design for Visible/Near IR Free Electron Laser
Oscillators; Cooled Optics for High Powered Laser
Applications; Impinged Droplet Evaporative Cooling for
Optical mirrors Subjected to High Thermal Flux Loads;
Radiation Effects in Optical Components; Gamma Radiation-
Induced Absorptions in Calcium Fluoride; Variation of the
Index of Refraction in Glasses Exposed to Ionizing
Radiation; Radiation Damage to Dielectric Mirrors; Effect
of Surface Pitting on Scattered Light in Transparent
Domes; High Damage Threshold Optical Coatings; Fluorine
Resistance of Dielectric Coatings for Excimer Laser
Optics; Porous Halide Antireflective Coatings for Adverse
Environments; Auger Analysis of Elemental Depth Profiles
Correlated with Multiple Laser Damage of GaAs Surfaces;
Compressive Coatings on Optical Components for Improving
Mechanical Durability and Increasing Strength. Keywords:
Symposia (JHD)

AD-A197 119

AD-A197 119

UNCLASSIFIED

PAGE 260

EVJ00F

DESCRIPTORS: (U) *ADVERSE CONDITIONS, *CRYOGENICS,
*SPACE ENVIRONMENTS, *OPTICAL EQUIPMENT, *OPTICAL
EQUIPMENT COMPONENTS, *LASER DAMAGE, *TROPICAL REGIONS,
FABRICATION, OPTICS, PATTERNS, METALS, RESONATORS,
CALCIUM FLUORIDES, DIELECTRICS, MIRRORS, ENVIRONMENTAL
IMPACT, AUGER ELECTRON SPECTROSCOPY, SPECTRUM ANALYSIS,
DIELECTRIC FILMS, COOLING, DROPS, EVAPORATION, EXCIMER,
FLUORINE, RESISTANCE, FREE ELECTRON LASERS, OSCILLATORS,
RADIATION ABSORPTION, GAMMA RAYS, RADIATION EFFECTS,
RADIATION DAMAGE, IONIZING RADIATION, OBSERVATORIES,
OPTICAL PROPERTIES, SPACE SYSTEMS, GALLIUM ARSENIDES,
SURFACES, MIRRORS, HEAT FLUX, LOADS(FORCES), THERMAL
PROPERTIES, PULSED LASERS, ANTIREFLECTION COATINGS,
HALIDES, POROUS MATERIALS, LIGHT SCATTERING, TELESCOPES,
PITTING, DOMES(STRUCTURAL FORMS), TRANSPARENCY, SYMPOSIA.

IDENTIFIERS: (U) PE81102F, WJAFOSR2301A1, Hubble
telescope.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVJ00F

AD-A197 075 24/7 6/11

NEBRASKA UNIV MEDICAL CENTER OMAHA

(U) Interactions Among Drinking and Ground Water Contaminants on Renal and Hepatic Function.

DESCRIPTIVE NOTE: Annual rept. 1 Aug 87-25 Jul 88.

JUL 88 87P

PERSONAL AUTHORS: Berndt, William O.

REPORT NO. 87-213-042-01

CONTRACT NO. F49820-86-C-0098

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-88-0717

UNCLASSIFIED REPORT

ABSTRACT: (U) The intent of this proposal is to examine the effects of selected water pollutants and their interactions with chemicals known to produce liver or kidney damage. The chemicals selected for study are either ground or surface water contaminants or are the by-products of chlorination, and hence are drinking water pollutants. The test compounds were selected on the basis of their potential for actions on the kidney or liver. The standard or reference substances to be used in these studies are known nephrotoxics or hepato- toxicants. To examine the effects of certain drinking and ground water pollutants (monochloroacetate, dichloroacetate, dichloromaleate, etc.) on hepatic and renal function in dose-response studies with particular emphasis on low-dose and multiple-dosing protocols; To examine the effects of selected drinking and ground water pollutants in conjunction with other drinking and ground water pollutants or with substances known to be nephrotoxic and/or hepatotoxic (e.g., mercuric chloride, chloroform, hexachlorobutadiene, maleic acid). Some of the interactions were of a potentiative nature and some were antagonistic. Chromate appears to enhance the nephrotoxicity of some of these test compounds. All of the studies in this report suggest an important role in

AD-A197 075

UNCLASSIFIED

AD-A197 075

PAGE 1

EVJ00F

AD-A197 075 CONTINUED

the tissue non-protein sulphydryls. Keywords: Rats. (aw)

DESCRIPTORS: (U) *CONTAMINANTS, *KIDNEYS, *LIVER, *TOXICITY, *WATER POLLUTION, CHEMICALS, CHLORIDES, CHLOROFORM, DAMAGE, DOSAGE, DRINKING WATER, GROUND WATER, MALEIC ACID, MERCURY COMPOUNDS, RATS, RESPONSE(BIOLOGY), SURFACE WATERS, TEST AND EVALUATION, TOXIC AGENTS, CHLORINATED HYDROCARBONS, ACETATES, BUTADIENES, KIDNEY FUNCTION TESTS, LIVER FUNCTION TESTS.

IDENTIFIERS: (U) Sulphydryl radicals, Maleates, PE81120F, WUAFOSR2312A5.